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Night View in Machine Shop of an Automobile Manufacturing Plant—A Splendid Example of General Shop Lighting That Stimulates Efficiency of Employes and Increases Production.

# What Better Industrial Lighting Can Do to Stimulate Production

## Fight on High Cost of Living Calls for Increased and More Efficient Production—Modern Factory Lighting Was Important Aid to War Production and Can Materially Help Present and Impending Conditions

By F. H. BERNHARD

ONE of the most serious of the many economic, political and social problems of the readjustment period is the fight on the high cost of living. The latter is generally recognized as a principal cause of the prevailing labor unrest, while the strikes and lockouts developed therefrom are in turn responsible for further increases in the cost of living. Thus has resulted a vicious cycle of successive price increases of labor and commodities, these conditions having called for most careful consideration by national, state and local authorities.

### NEED FOR INCREASED AND MORE EFFICIENT PRODUCTION.

The findings of the Council of National Defense in a special report on the subject indicate "that the high cost of living is primarily due to curtailment in the production of nearly all commodities except raw food products, to hoarding of storage food products, to profiteering, conscious and unconscious, and to inflation of circulating credit; and *that the situation may be most advantageously met by stimulated production,* the repression of hoarding and profiteering, the improvement and standardization of methods and facilities for distributing and marketing goods, and the perfecting of means of keeping the nation informed regarding probable national requirements and current production and stocks."

President Wilson in a recent statement said: "Only by keeping the cost of production on its present level, *by increasing production,* by rigid economy and saving on the part of the people can we hope for large

decreases in the burdensome cost of living which now weighs us down."

All other authorities that have studied the question likewise are agreed that increase of production will in very large measure solve the situation and every group of remedies proposed includes it. Many careful students of the subject place it as the most essential and effective remedy, the other measures being in the nature of expedients to relieve the high costs temporarily.

When it is remembered that in nearly every country on the earth there has been disturbance of normal production for two to five years—underproduction of peace-time commodities almost everywhere, in so many countries aggravated by concentration of production upon war supplies and wholesale destruction of homes and factories and devastation of fields, forests, etc.—it is difficult to conceive how anything like normal supplies and prices of commodities can be restored without greatly stimulated production continued for several years at least. Nor does it seem probable or even possible for prices to come down rapidly. Even with special efforts to accelerate and facilitate production, the increased burden of taxation and the high wages will retard return to prewar prices for many years and such low prices may never return. There is, therefore, no legitimate cause for hesitancy on the part of producers.

Because of many uncertainties since the signing of the armistice much of the production has been at low economy because plants have been run on part time and in small sections, thus giving poor load-factor and low efficiency; intensified production should permit continuous and complete operation of entire plants and therefore result in some decrease of production cost. Corresponding decreases in prices should mean greater sales and these in turn permit further increase of production.

Increase of production will furnish greater relief if it is definitely accompanied by greater efficiency of production. As a rule, improved efficiency usually results from full-time operation with continuous processes and large-quantity production, as just mentioned. The wage increases of the last few years and the tendency to shorten working hours call for still further efficiency, if possible, to offset the higher production costs caused thereby. In other words, if greater output per employe can be obtained, either through more extended use of machinery and improved processes or greater individual efficiency of the employe, the wage increase can be partly or wholly absorbed and the price may be brought back substantially to what it was before wages went up. In many cases this increased efficiency is possible and every effort should be made to realize it so that costs and prices, if not actually reduced, should at least be kept from rising further.

Efficiency in production is always desirable in every industry on the score of general economy, but at no time is it more essential than during periods of keen competition and during great emergencies, like the recent war and the present troublesome readjustment period. At present inefficiency is more inexcusable than ever before because it is a direct upholder of high costs and prices. Whatever is done to increase production efficiency now will not only be of great value in the present crisis but will prepare for the intense international competition that is bound to grow as the countries most actively engaged in the late war gradually get back on their feet, when every source of waste and low efficiency will have to be eliminated unless dependence is placed on uncertain artificial restraints on foreign trade.

### How Lighting Affects the Efficiency and Amount of Production.

The writer believes that no facts can be presented to controvert the foregoing brief statement of the present and future need for increased and more efficient production. The question then arises, upon what factors does such production depend or how can it be attained? It may be briefly answered that the quantity of production depends primarily (1) on the extent of the facilities available in the way of buildings, machinery, and other equipment, and the number of employes, that is, on the size of the plant, and (2) on the joint efficiency of the entire plant, including that of the processes, machinery and equipment used, that of the management, and that of the employes in general.

As an outcome of the foregoing, it is obvious that the output of a plant can be increased by increasing its effective size, or by increasing its efficiency, or both, but the most economical method is that which secures the output increase at minimum increase of capital and minimum increase in the number of employes. This means that any improvement in efficiency of the men or of any other essential element of the plant is much more remunerative than a plant extension and the increased output thus obtained is probably secured at the lowest unit cost. At the present time the abnormal costs of building materials as well as the numerous strikes in the building trade make it doubly undesirable to make plant extensions if any alternative can be resorted to. The remainder of this article will attempt to show that improvement of lighting is one of these alternatives, that it makes for higher efficiency of the men and of the plant as a whole, and that it stimulates production, thus yielding beneficent results greatly beyond its modest cost.

During the war every effort was bent to making the so-called essential or war industries as productive and efficient as possible. The results are well known. If it had not been that American industry aroused itself and backed up the fighting men with munitions and supplies, the war might still be on.

Old plants were in many cases rehabilitated as to their lighting and other facilities so as to make it possible to double or triple the output at almost no additional capital expense by operating with two or three shifts per 24 hours. This is the most extraordinary way to increase output quickly and at almost no investment outlay. It practically doubles or even triples the return on the investment. Even if night work in some cases has involved slightly higher rates of pay to the employes, the greater continuity of processes and other economies to be mentioned below have offset this as well as the fixed charges, operating cost and maintenance of the lighting system. These total lighting costs amount to only a very small fraction of the entire labor cost. It must be remembered that a good, modern general lighting system can be installed at nearly the same, or in some cases at even less, cost than the inefficient system still so commonly in use.

Definite economies are commonly obtained by continued operation that eliminates the cooling down of furnaces, kilns, and in winter even of the buildings themselves between shifts; in many cases the quality of the product is improved by continuous processes, as in those involving chemical changes. The main fact in this connection that was demonstrated in

many cases during the war was that a scientifically designed and efficient lighting system could permit ready increase of the output to two or three times through multiple-shift operation and could also permit utilizing intensively parts of the plant whose inadequacy of daylight or other lighting made them practically worthless, all at very little increase in the invested capital.

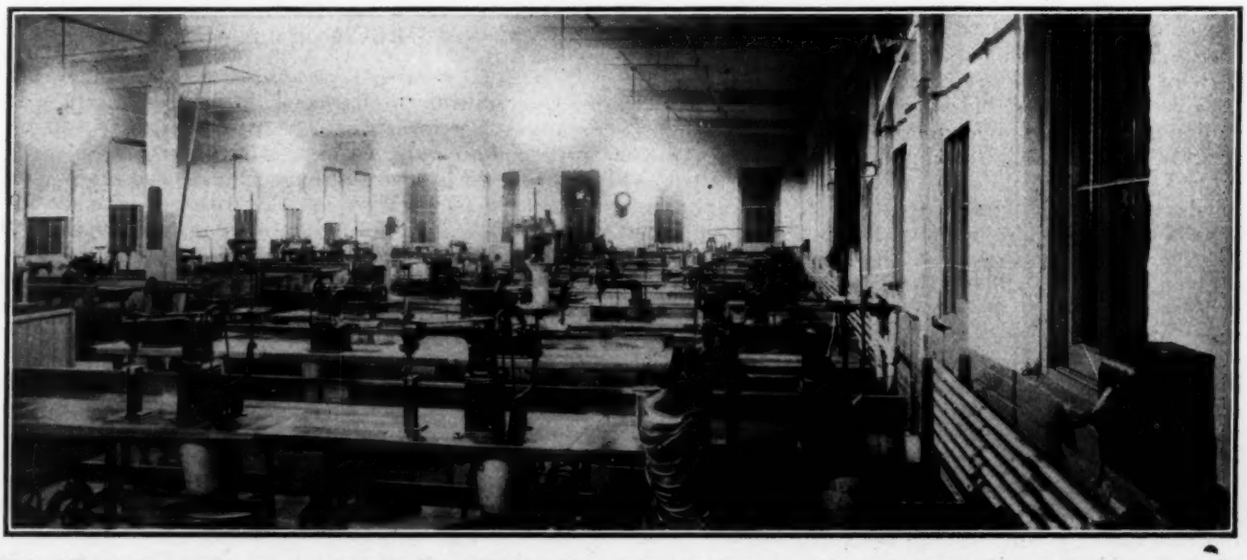
The great attention almost invariably given to lighting of the new plants built during the war also showed that generous windows and skylights, well placed or equipped so as to obviate the sun's glare, paid in the excellence of the daylight secured, and the similar generous, well placed and properly equipped electric lighting units installed also paid handsomely in the excellence of the artificial lighting that was ready at a moment to replace any deficiencies of the natural lighting and permit operation at any hour of the day with an efficiency equal to that of broad daylight. It was found that it was neither difficult nor costly to secure such lighting equipment as would enable this unimpaired efficiency to be maintained regardless of cloudy days, storms or other weather conditions, and of the darkness of the morning, evening or night hours. Thus in both old and new war plants lighting received probably the most extended recognition of its importance and value that has yet been accorded it. This importance was merited because of the very substantial increase it made possible in the general efficiency of the entire plant and in the personal efficiency of the employes.

Turning now to this question of personal efficiency we find in every poorly lighted plant that considerable time is lost by the employes' inability to see their work properly on cloudy days, during storms, and during the inadequate daylight of the early morning and late afternoon hours of fall and winter days, so that the output per employe for each of these dark hours is considerably lower than when daylight is plentiful. Several causes contribute to this, chiefly the impaired efficiency of the eye under inadequate or poor light, which causes one to take more time to do work requiring perception of detail than when the light is suitable; eye strain is a usual accompaniment of attempts to work under improper light and results in further loss of visual efficiency and time. Even where the resulting loss of time is only a few seconds or a fraction of a minute per operation, the total time lost for scores or hundreds of operations effected during the hours of inadequate lighting may amount to from half an hour to one or even more hours per day—an outright loss of useful time for which the employe is paid but is unable, through no fault of his, to render effective service.

Where the lighting is unsatisfactory the visual strain of attempted work leads most employes to let up on their usual pace or else do their work in a slipshod fashion that means much spoilage and work that must be done over. Moreover, poor lighting makes supervision of workrooms difficult so that lazy employes are apt to spend as much as an hour at a time in some obscure part of the plant merely "killing" time, if not actually asleep. In a well managed and properly lighted plant this could not happen, but it is surprising to what extent it does happen in poorly lighted factories.

All the various losses of time aggregate a considerable amount in the average ill lighted plant, as has been shown not only by direct observation but by the indirect proof of substantially increased output after the lighting has been rehabilitated to modern scientific standards. Increases of output from 2 to 25% or even more have been proven after the lighting was modernized, 10 to 15% being a common average. These increased outputs are the result chiefly of the improved visual efficiency, but another source of higher personal efficiency is the psychologically stimulating effect of bright and cheerful workrooms which produce alertness and keener application to duty, as well as dispel the depressing effect of gloomy surroundings.

Emphasis has been given in the foregoing only to those ways in which good lighting has a direct influence in increasing production, either through more intensive utilization of the plant or through improved efficiency of the workmen. It is known to have other beneficial effects also, most of which help indirectly to stimulate production. Thus it improves the quality of the product and reduces spoilage, it promotes order and neatness in the plant, it reduces accidents, lessens eye strain, makes more cheerful working environment, and promotes contentment of the employes. The four latter features have an immediate bearing upon the working conditions and thus also influence



**Night View in Sewing Room of a Shoe Factory, Showing That Even the Exacting Work of Sewing Can Be Done Successfully Where Suitable and Yet Highly Efficient General Lighting Is Provided.**

the personal efficiency of the men, while at the same time they tend to reduce labor turnover and diminish the likelihood of labor troubles.

Aside from the increase of production, which has been the subject of numerous tests and has been conclusively proven to average from 10 to 20% after putting in an up-to-date lighting system, the other benefits of good industrial lighting are somewhat intangible because so difficult to segregate and demonstrate quantitatively, or on a dollar-and-cents basis. They are not less real, however, nor to be ignored. In fact, in some industries they are of almost more importance than production increase alone. But they are such close accompaniments of the latter that their benefit is almost invariably added to that of stimulated production and therefore makes a modern lighting installation that much more valuable, so that in view of its low cost any obsolete lighting is entirely inexcusable.

### Big Field for Further Factory Lighting Betterment.

It has been mentioned that considerable improvement in factory lighting was effected in the last two years in plants engaged upon war work where it was recognized that good lighting was an important means of stimulating production. The importance of improved factory lighting has also been recognized by the fact that in the last few years the number of states that have industrial lighting codes has been practically doubled. It must not be concluded from this, however, that a majority or even large percentage of factories really have lighting systems that meet the illuminating engineering requirements of the present day.

The truth is far from this. Most factories are still very poorly lighted. As a rule, natural lighting facilities (windows and skylights) are inadequate, poorly located and equipped, and poorly maintained. In some cases, artificial lighting is entirely unprovided for, thus making a very hazardous plant and one whose production is dependent largely on the weather and season. Where lighting systems are installed, they are in very many cases provided with obsolete and inefficient equipment, improperly placed and improperly maintained, so that the resultant illumination is inadequate, very poorly distributed and very often extremely glaring at many points while other places are in deep gloom. It is the common prevalence of such lighting conditions that has given rise to the factory lighting codes referred to.

Even in factories that have installed fairly modern equipment, it is not uncommon to find poor maintenance thereof. As an example, there was recently observed an installation of well built enameled-steel bowl reflectors designed for 100-watt vacuum type Mazda lamps; these were not kept clean and the lighting became inadequate, so the lamps were replaced with 200-watt gas-filled Mazda lamps. Since the reflectors were not designed for the latter lamps, there was a great deal of glare and uneven distribution. The higher efficiency of the new lamps merited discarding the reflectors and re-equipment of the units with reflectors of the latest type designed for these lamps. The progress of lighting developments is so rapid that it pays to overhaul the entire system at intervals of 3 to 5 years in order to take advantage of the advances of the art in making the lighting more effective and efficient, which means more productive.

Meanwhile there is the great mass of factory owners and managers who still have to be shown that the equipment that was thought to be satisfactory 10 to 15 or more years ago, because none other was then available, comes far from meeting present-day lighting requirements. On the other hand, modern ideas of factory management call for making the plant facilities conducive to the highest production efficiency and they recognize in the most up-to-date lighting equipment a most valuable and economical means for stimulating the production.

Supplementing the present article, the author has in preparation one on "What Better Industrial Lighting Can Do to Improve Working Conditions," in which it will be shown that it should aid in ameliorating the present industrial unrest. This article will appear in the issue of Sept. 20.

## INTER-RELATION OF SCIENTIFIC LIGHTING AND INDUSTRIAL EFFICIENCY.

**Leon Gaster, Honorary Secretary of British Illuminating Engineering Society, Lectures on Value of Good Shop Lighting.**

In a lecture on "Scientific Lighting and Industrial Efficiency," at the British Scientific Products Exhibition, Central Hall, Westminster, London, Leon Gaster referred to the close relation existing between good industrial lighting and the health of workers, and gave many instances of accidents due to insufficient or badly arranged conditions of illumination. Light, he said, was a "tool," and it was absurd to install expensive machinery, and to pay highly skilled workmen, and then to neglect the relatively small expenditure on illumination necessary to the efficient performance of work. Instances were quoted showing that, as a result of improved lighting conditions, increases in output of 8 to 27% had been recorded. When the need to increase production was so great, and when the necessity of saving fuel was so evident, the application of scientific methods to factory lighting was of special importance. The Illuminating Engineering Society was in a good position, he said, to render assistance in making clear the essentials of good industrial lighting, by means of lectures and demonstrations.

## INSPECTION AND LIFE TESTS OF INCANDESCENT LAMPS.

The total number of lamps offered for delivery to the Government purchasing authorities during the past fiscal year was over 5,000,000, of which about 600,000, or 12%, were rejected on the initial inspection at the factory, which covers the mechanical qualities of the lamps and their rating in regard to power consumption and efficiency. In this initial inspection samples are selected for the burning or so-called life tests. During the year nearly 3500 lamps were subjected to this life test, and with few exceptions the tungsten lamps, both vacuum and gas-filled, supplied under Government contracts, had a life considerably in excess of the 1000 hours of burning required by the standard specifications.

At the request of the General Supply Committee, tests were made in connection with bids of various manufacturers for the contract for the next fiscal year, and a considerable range in quality among the lamps submitted was indicated. It is probable that the information obtained by these tests alone repays the total cost of the lamp work for the year.

# Electric Cooking Load as Developed by Detroit Edison Company

## Local Factors Involved—City and Rural Business—Range Troubles and Voltage Regulation—Revenue Derived—Paper Before Michigan Section N.E.L.A.

By R. F. HOTTON

*Detroit Edison Co.*

THE Detroit Edison Co. has not encouraged the electric cooking business in its metropolitan district and has not sought the business in the rural communities which it serves. The reason for not developing this field are:

Its metropolitan district has a good and cheap gas supply, and electricity for cooking is not an actual need.

During the development stage of the cooking equipment, the high first cost and the heavy repair charges put this equipment out of competition with the well developed and cheap gas equipment.

Under the general living conditions of the metropolitan community, the heavy cooking is for the evening meal, and a cooking load, if such a load were developed, would be superimposed on the lighting load, and in accordance with the rate methods of the company, such business should be taxed for its share of fixed charges, and the consequent rate would be too high to secure business.

Except for the cost of repair on equipment, these conditions are modified in rural communities. Few rural communities have a gas supply, and there is a need for electricity for cooking. The important meal is generally cooked in the middle of the day, and the late afternoon demand is for a short period. These differences of use permitted the establishing of a cooking rate for the rural districts and the need for electric cooking was evidenced by an immediate demand for the service, which is constantly growing. The rate established was 3 cts. per kw-hr., and has been effective since 1916.

This paper deals with the cooking business as it has developed in one of The Detroit Edison Co. districts, serving a rural territory of sixteen communities, ranging in population from 200 to 10,000. There is a gas supply in only one city—that of Mt. Clemens, having a population of 10,000. The number of farm customers is about 650, approximately 10% of the customers in the district; and the number of ranges installed and used by farm customers is 10% of the 314 ranges installed, so that this data is representative of town and small city business, rather than farming districts.

An important fact forced to our attention in the early stages of this development was the changes necessary in our regular lighting distribution to take care of the load created by the connection of ranges to these circuits, but we did not begin immediately to keep track of the cost of these changes. To date we have records of cost on 31 installations, which we are quoting. Changes represented by these costs will accommodate many more stove connections if we sell stoves to customers in the vicinity, so that as the business increases, the average cost per stove should show a lower figure than the ones quoted. These figures do not include the cost of superintendence and engineering. On 23 installations changes were required in primary or secondary distribution or transformers—in some cases all three factors were affected. The average costs on these 23 installations were as follows:

| | |
|---|---|
| Labor | $ 25.00 |
| Material other than transformers | 17.20 |
| Transformers | 61.40 |
| Total | $103.60 |

On eight installations the only change required was increasing the service loop, at an average cost of $10.50, making the average cost on the 31 installations $93.11. These figures do not include any salvage on material returned, and it is doubtful that anything but junk value could be placed on it.

We have from the first and are continuing to furnish free repairs for stoves and have replaced units, standing the expense of renewals when the manufacturer did not do so. This service is an expensive one, and record of the cost has not been kept. Our greatest difficulties have arisen from mechanical rather than electrical defects, although each type of element developed different troubles with use.

### Opinions on Range Troubles.

The first enclosed type does not stand line disturbances of a lightning storm, the construction of the oven unit making it even more susceptible than the surface unit to these disturbances. The surface units buckle and warp with use. The difficulties have been fairly well eliminated, but the light mechanical structure of the terminals continues to cause trouble with this type of unit. In the next type, the open coil type, the element difficulties were overcome, but the terminal connection is not much improved—the terminals having insufficient protection from the heat of the unit burn off at the junction point. The wiring used in the stoves is not heavy enough for the wattage of the units. This latter trouble may be overcome by rewiring the stove with larger wire, which we do when trouble develops. Repeated reports of these defects to the manufacturer have not resulted in improvements. However, most of the ranges on our lines are of a later type having the molded block open coil. On a few of the first ranges, we discovered that the range wiring was unbalanced having approximately 75% of the load on one side. This condition caused a drop in pressure on a small transformer when only the heavy side was in use.

Another source of trouble with this range was the crystallizing of the oven terminals—this defect has been overcome by making the terminal connection on outside of the oven.

During 1917 and the early part of 1918, several customers in different locations in the district com-

plained of the length of time it took to do their cooking on the electric range. When we would receive a complaint of this nature our first step would be to take a voltage test at the entrance point of the service and then at the range terminals with stove on and off. If the voltage at the terminals was below 2% of the rated voltage, we would try to increase this by means of moving the transformer closer to the entrance point and in some cases it was even necessary to boost the voltage on our primaries. In one particular installation something over $300.00 was spent without giving the customer satisfactory service. Finally, we installed a set of 105 volt units, this has proven successful in every case. We now specify 105 volt units with every range order.

In order to determine the terminal voltages at rated wattage and the actual wattage inputs of the electric range units, a series of tests were made May 12, 1919, by our research department. Because of general similarity of construction, all surface units now in use may be classified into two types, enclosed and open coil; the open coil can be subdivided into molded block and reflector. The following method of testing was used; two runs were made on each unit. First, the units of each type were numbered 1, 2 and 3. Each unit was tested at a time, starting with the unit at room temperature. The a-c. voltage was kept constant at 110 volts. The current flowing through the unit and the input in watts were observed every minute for five minutes and every five minutes thereafter until two successive observations were identical. If the data for the three units of each type agreed closely, the one nearest the average was used in the table. If the units showed a variation of 5% or more, the extreme high and low test was used.

A sheet metal frame was made up which held the surface units, bringing them as near actual range conditions as possible. The efficiency of the units was obtained in a simple manner as follows: Two quarts of distilled water at a temperature of 60° F. was placed in a cast aluminum kettle (with cover) upon a unit. Current at a constant potential of 110 volts was turned on the unit (beginning cold) until the water reached the boiling point, as registered by an open scale chemical thermometer. At the same time the energy consumption was recorded. The terminal voltage at rated wattage will be found in Table No. 1. On the average they keep within 5% above or below 110 volts, but with the enclosed type of unit they varied as much as 9% below 110 volts and 11% below 110 volts with the open coil reflector unit. Cases were found where the elements were improperly marked. Out of 13, 1500-watt enclosed units, 31% were found to have but a 1000-watt capacity at 110 volts. One out of three of the open coil (molded block) was marked 880 watts but actually had 1100-watt capacity at 110 volts.

TABLE I.

| Type. | Size. | Watts. | Volts for rated wattage. | | Wattage at rated voltage of 110. | |
|---|---|---|---|---|---|---|
| Enclosed | 8½" | 1,500 | 107.2 | 113.5 | 1,576 | 1,403 |
| Enclosed | 8½" | 1,000 | 106.4 | | 1,060 | |
| Enclosed | 6 " | 1,000 | 100.8 | 106.7 | 1,182 | 1,059 |
| Enclosed | Oven | 1,500 | 109.1 | | 1,520 | |
| Open coil reflector | 8½" | 1,500 | 109.6 | | 1,515 | |
| Open coil reflector | 7½" | 1,200 | 110.2 | | 1,200 | |
| Open coil reflector | 6½" | 800 | 99.8 | 112.4 | 958 | 764 |
| Open coil reflector | Oven | 1,200 | 110.9 | | 1,183 | |
| Open coil reflector | Oven | 1,000 | 108.7 | | 1,020 | |
| Open coil molded block | 8½" | 1,500 | 110.7 | | 1,485 | |
| Open coil molded block | 6½" | 1,100 | 109.3 | 113.2 | 1,110 | 1,145 |
| Open coil molded block | 6½" | 880 | 107.1 | | 924 | |
| Open coil molded block | 4 " | 440 | 110.8 | | 434 | |
| Open coil molded block | Oven | 1,100 | 106.8 | | 1,154 | |
| Open coil molded block | Oven | 880 | 102.2 | 109.2 | 1,012 | 890 |
| 105 Volts— | | | | | | |
| Open coil molded block | 10 " | 2,000 | 108 | | 1,900 | |
| Open coil molded block | 8 " | 1,000 | 104.3 | | 1,015 | |
| Open coil molded block | Oven | 1,000 | 103 | | 1,032 | |

The most important factor in the electric cooking service is to give good pressure and quick repairs. We make no charge for repairs unless it is apparent that trouble is result of carelessness on part of users of the stove. During 1918, we had 128 range trouble calls, which were as follows:

TABLE II.

| Surface Units 1500 W. | Surface Units 880 W. | Surface Units 440 W. | Oven Units 1100 W. | Oven Units 1000 W. | Gridiron | Misc. |
|---|---|---|---|---|---|---|
| 26 | 15 | 9 | 32 | 4 | 6 | 36 |

CHARACTERISTICS OF COOKING LOAD.

For the characteristics of the cooking load the following test was made during the period from December 25, 1918, to January 2, 1919, on a group of five ranges that are connected to one 25-kw. transformer. In addition to the ranges there are 15 lighting circuits connected to the transformer, which load could not be separated from the cooking load. Range services are all taken directly off the transformer pole, and all of the connections are within two sections of the transformer.

The load was recorded on two Bristol recording ampere meters, one located on each side of the neutral wire. The sum of the two readings at any time thus gives the total current output of the transformer at that time.

The readings for the six days December 25, 26, 27, 29 and January 1 and 2, were selected and the total load on the transformer for each hour of the day was obtained by adding the readings of the two meters. The curves shown were thus obtained, giving the characteristic average loads during the day and the maximum loads recorded during the period from each hour of the day, also the loads on the maximum day, that is the day on which the total kilowatt-hours consumed was the greatest.

It will be seen that the curves have similar characteristics at all essential points. They all show well defined peaks as might be expected, indicating the time of breakfast preparation, morning baking, dinner preparation, afternoon baking, supper preparation, etc. The fact that there is considerable lighting load in addition to range load probably affects the shape of the curves somewhat—especially in the early morning and in the evening. Also the fact that most of the residences have some other appliances such as vacuum cleaners, washing machines, etc., would affect the slope of the curve. Since the range load is large in comparison to the other devices, the curves may be considered fairly characteristic of range services.

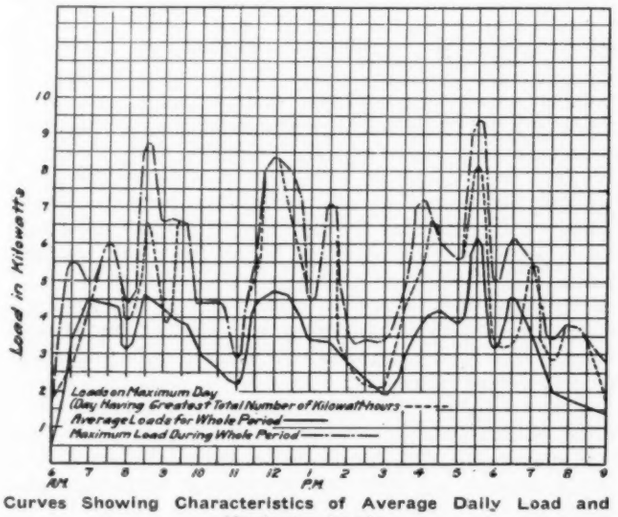
It is interesting to note how closely the curve for the maximum day follows that of maximum for the period, showing that, for the most part, the maximum for the period occurred on the maximum day. The average curve had most of the sharp peaks smoothed out and since its shape agrees closely with that of both the other curves, this is probably very nearly the typical variation throughout a day which we might expect to find under any similar condition, i. e. range load combined with lighting and appliance load.

The diversity factor of such loads is also illustrated. The maximum load for the whole period was less than

10 kw. The transformer installed, 25 kw., was sufficient to care for all five ranges together, but due to the diversity in use the actual load was never greater than 40%. A 10-kw. transformer would be sufficient. This diversity will vary with the number of ranges on one transformer. With a less number of connections, a greater proportion of the connected load must be provided in transformer capacity.

The following tabulation shows the average net revenue from a varying number of range customers for the year 1918. The reason for the higher average during the summer months may be attributed to the summer homes, which are closed in September for the winter. Another reason is that some customers use coal or wood ranges in the kitchen during the cold months for heating as well as for cooking.

| 1918 Month | Number of Customers | Total Kw-hr. | Total Revenue | Average Net Bills |
|---|---|---|---|---|
| January | 119 | 12,161 | $346.64 | $2.91 |
| February | 127 | 11,325 | 323.44 | 2.54 |
| March | 128 | 10,957 | 317.04 | 2.31 |
| April | 128 | 15,117 | 412.80 | 3.22 |
| May | 133 | 16,397 | 467.31 | 3.55 |
| June | 148 | 19,862 | 543.77 | 3.67 |
| July | 178 | 29,747 | 807.24 | 4.53 |
| August | 195 | 32,665 | 889.08 | 4.55 |
| September | 204 | 31,305 | 856.65 | 4.19 |
| October | 202 | 23,882 | 659.19 | 3.26 |
| November | 202 | 22,002 | 611.18 | 3.02 |
| December | 201 | 18,669 | 513.88 | 2.55 |




Curves Showing Characteristics of Average Daily Load and Maximum Loads.

There is one point at least that should be emphatically stated; that is, that electric cooking is strictly scientific, and, therefore, possesses a great advantage over all others. The scientific feature associated with electric cooking is its exactitude. Electric heat provides a fixed temperature for each particular type of cooking and thus illustrates the main feature of the new system. It is exact, and therefore, the products of it are more reliable than by other means. This is what is meant by its being more scientific. Since there is no flame in an electric range, there is no combustion and consequently no possibility of poisonous fumes escaping to contaminate the atmosphere and the food which is kept in the kitchen or pantry. The air in the kitchen will remain so pure that even delicate flowers may be kept near the stove without fear of withering. The elimination of matches and the fact that there is no flame which means absolute protection from fire, no danger of explosions, no smoke, fumes or discolored walls. All of this is done away with. The electric range is especially desirable in the warm summer months, there being no radiation of heat in the room. These features have undoubtedly helped the more extensive sale of ranges. Electric lighting was accepted by the public years ago because it has advantages that other systems of lighting did not have, therefore, if one system of cooking has an advantage over others, there is every reason to expect its final acceptance by the public.

Looking over this paper, the question arises in our minds: "Do the earnings warrant this investment?" However we cannot stop a landslide. Cooking by wire has come to stay. The best and only solution will be to build up the business to the point where we can serve several customers from one transformer. In conclusion, we might add that the electric range business ties our customers more securely to us than the electric lighting and in this way makes them more dependent and more appreciative of our service.

## THE ELECTRICIAN'S TABLE OF ELECTRICITY UNDERTAKINGS.

The latest issue of the *"Electrician's* Tables of Electricity Undertakings" has just been received in this country. This is published annually by Benn Bros., Ltd., London, also publishers of *The Electrician.* It contains a list of the central stations operating in the United Kingdom, the British colonies and some foreign countries, and also considerable information concerning them. Among the latter are the engineer's name, a brief description of the systems of generating and distribution, number and types of public lamps served, total motor load, maximum recorded load, maximum traction load, capacity, the number and size of generating sets, fuel used, prices charged for service, number of showrooms, and the names of the purchasers of current for traction purposes, also the prices paid for such service. The list and information contained pertaining to the British and colonial undertakings is very complete but that of the foreign countries is limited to the larger concerns.

## ENGINEERING SOCIETIES ADOPT RESOLUTIONS ON CARNEGIE.

Andrew Carnegie's death August 11, 1919, at Lenox, Mass., brought to its close a career which greatly advanced all the engineering arts and sciences. By the introduction into the United States of the Bessemer process for the production of steel and by the establishment and development of steel plants, which became the greatest in the world, he made available for engineers the most useful modern material for engineering construction. His munificence provided large funds for the building of a home for the great national engineering societies in New York and many associate societies. He was an honorary member of the American Institute of Mining and Metallurgical Engineers and American Society of Mechanical Engineers. In view of these facts, the following resolution was recently adopted:

*Resolved,* That the American Societies of Civil, Mining, Metallurgical, Mechanical and Electrical Engineers, the United Engineering Society and the Engineers' Club, herein express to the family of Mr. Carnegie and record their sincere appreciation of the great contributions of Andrew Carnegie to the advancement of engineering, and of his friendly assistance in making possible beautiful homes for the Engineering Societies and the Engineers' Club, thus fostering the spirit of unity in the profession.

# Central-Station Rates in Theory and Practice

## Ninth Article—Comparison of Cost-of-Service and Value-of-Service Principles in Rate Making — Price Splitting — Analysis of Relations Between Selling Price and Earnings

By H. E. EISENMENGER

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*This is the ninth article of this series. A general outline of the series was published in the issue of July 5, and the first article in the issue of July 12. The first seven articles discussed the cost of rendering central-station service, a knowledge of the cost being necessary before rates can be intelligently considered. Last week's article introduced the subject of prices or rates and treated especially of the three general principles on which the amount of profit may be based. This subject is continued in the present article and a mathematical analysis of it is begun in Insert IX. On account of the length of this Insert, the next two articles will be devoted to it exclusively, the main text being resumed in the twelfth article (Sept. 27) and continued throughout practically the remainder of the volume.*

### PART II—THE PRICE OF ELECTRIC SERVICE—Continued.

#### III. The Value-of-Service Principle.

SECTION 78. In comparing the value-of-service principle with the two others previously mentioned as to their merits we could dismiss the "what-the-traffic-will-bear" principle (maximum earnings) from the outset as unethical and unfit for public service corporations. We would confine ourselves to a comparison between the cost-of-service principle and the value-of-service principle, but since the latter is nothing but an evolution of the maximum-earnings principle, we will have to pay attention to the latter principle also.

In order to determine the relative advantages of the cost-of-service and the value-of-service principle, both to the consumer and the producer, it is convenient to assume that we have been making our charges first on the cost-of-service basis, that is, we have been charging the same percentage of profit to every customer and for every particle of service. We assume further that the price has been regulated so that the earnings derived from that system of charging are just what is considered fair, neither more nor less.

Then we change over to charging on the value-of-service basis, in such a manner that the earnings (gross income, net income or net rate of return) of the producer remain unchanged, or at least are not reduced below what has been recognized as fair. The producer will therefore experience at least no damage as a consequence of the change-over. We will first investigate under what conditions it is possible to make such a change-over to the value-of-service principle in such a manner that the price is not increased to any consumer[1]. This means that we will begin our investigation with that part of the value-of-service principle which requires only a lowering of the price (namely, for those parts of the service for which the respective consumers are not willing or able to pay the original price), but we will leave out of consideration, for the beginning, an advance of the price for those parts of the service for which the customers would be willing and able to pay more than the original price. The value-of-service principle will then be of indisputable advantage to some of the parties concerned and of disadvantage to nobody. Then we will extend our investigation to the introduction of raised prices, where necessary.

79. The change from the cost-of-service principle to the value-of-service principle means that we will charge no longer one uniform price[2] throughout, but a number of prices in accordance with the valuation of the respective service or part of service by the respective customer, that is, in accordance with the customer's power and willingness to pay for the respective service. This process of judiciously raising or lowering the prices according to the valuation of the service will be called *"price splitting."* If price splitting comprises only price reduction and no increases it will be called *"price splitting downwards"* in contradistinction to *"price splitting upwards."* Of course, price splitting downwards and upwards can be combined, so that some prices are reduced, others raised with respect to the original price.

80. In Insert IX is given an analysis of the relations between prices and earnings, including an investigation of the conditions which bring about the possibility of increasing the earnings by splitting the prices downwards only, that is by lowering the prices of at least some parts of the service and to at least some customers, but raising them to nobody.

[Since the next Sections refer to Insert IX, their publication is deferred until Insert IX is completed.]

[1] If the prices are made lower to some customers than to others, the latter are liable to complain that they are "discriminated against" and to demand that the same prices be charged to every customer. This demand is prompted by a hazy feeling that in that case the resulting price will be the average between the prices charged previously to the various customers, or at any rate lower than the prices charged to the complaining customers, because, it is stated, "the minus of profit from the favored customers must be covered by a plus from the others."

In a well designed rate system this assumption is not justified. The price reduction to certain customers increases the aggregate consumption and therefore the production. A larger production results in a lower unit cost so that the central station can, as a next step, reduce the prices, for instance, to all customers alike by a certain constant percentage, without reducing its own profits below what they were originally. (In fact the profit of the central station may even be left higher than it had been before the first price reduction to the "favored" customers had been made.)

Thus the customer who is grumbling that he has to pay more than some other customer is actually paying less than he would have to pay if he were not "discriminated against."

This problem is treated in detail in the following Sections.

[2] Or, more accurately speaking, prices with a uniform percentage of profit.

## Insert IX—Appendix to Section 80 et Seq.—Relations Between Selling Prices and Earnings.

(For readers who are familiar with mathematics.)

### I. Prices Independent of the Customer's Valuation of the Commodity (Cost-of-Service Principle).

#### A. The Four Fundamental Facts.

1. The deductions in this Insert are based on four facts which are partly so self-evident and partly so generally known that they need no proof and can be accepted as axioms. These four facts are:

*Fact No. 1.*—Although we do not know just how the quantity $m$ sold of a certain commodity varies with varying unit prices, it is obvious that with increasing prices the quantity sold will steadily decrease—other conditions remaining equal—and vice versa.

*Fact No. 2.*—If the price $p$ per unit is zero, the quantity $m$ will not be infinity, and with rising prices the quantity $m$ will become zero at a finite value of $p$.

From Nos. 1 and 2 follows: If we plot the unit prices $p$ as abscissae and the quantities $m$ as ordinates (heavy curve in Fig. A, compare also Fig. 2 of the main text) we will get a curve which will steadily fall from the left to the right, whatever its shape may be otherwise, and it will intersect the axes at finite distances from the origin $O$. This curve will be called hereafter the "sales curve."

*Fact No. 3.*—Let $s$ designate the total cost of producing a certain quantity of the commodity per year including those capital charges which are, theoretically at least, independent of the earnings (bond interest, depreciation, etc.) but excluding the net return of the capital invested (dividend). Then $s$ is a function—$f(m)$—of the quantity $m$ produced; it is in general not simply proportional to $m$, but consists of a constant part and of a part which is approximately proportional to $m$, so that the increment cost per unit produced is approximately constant and $f(m)$ is a straight line. Stating the law of cost in more accurate terms, we will have to recognize that a large manufacturing enterprise (central station), on account of larger and more economical machinery and for other reasons, will be able to produce an incremental unit more cheaply than a small enterprise. The increment cost per unit is therefore not independent of the amount produced $m$, but it decreases continually with increasing $m$, from a maximum value for $m=0$ to a minimum value for $m=\infty$, this minimum being still positive. The curve of cost $s=f(m)$ plotted against $m$ will therefore start from the axis of ordinates ($m=0$) at a certain distance $OS_0$ from the origin $O$ (see Fig. A[1]) so that $OS_0$ is the constant part of the cost and then the curve will steadily rise with increasing abscissae $m$, displaying a certain concavity towards the axis of $m$. If we want to go into further details, we can even say that the curvature of the line will decrease (radius of curvature increase) with increasing $m$ because the increment of cost per unit produced converges towards a certain limit for $m=\infty$. The curve will asymptotically approach from below a straight line which is slanting upwards.

It is not essential for the investigations of this Insert to assume that the curve of cost $s=f(m)$, whether it be a straight line or a curved line with the concave side pointing downwards, intersects the axis of ordinates at a certain distance above the origin. The curve of cost may also pass through the origin, which is only a special case ($OS_0=0$); it may, for instance, be a parabolic function of the amount $m$, of the form $s=\gamma m^{\alpha}$.

From the left part of Fig. A we get the following two relations.

$$\text{Average cost per unit} = \frac{s}{m} = \frac{f(m)}{m} = \tan\sigma_0 \quad \ldots\ldots (1)$$

$$\text{Increment cost per unit} = \frac{ds}{dm} = \frac{df(m)}{dm} = \tan\sigma \quad \ldots\ldots (2)$$

*Fact No. 4.*—The curve $k=F(m)$ of the capital invested $k$ plotted against the quantity sold (or rather produced) $m$, in the same manner as has just been shown for the cost $s$, has the same character as the curve $f(m)$ and everything said about the characteristics of the curve of cost applies to the curve of the capital also. See Fig. A curve $F(m)$, which is drawn to another scale than $f(m)$, that is a dollar per year in the $s$-curve is not represented by the same length as a dollar in the capital curve.

[1]As the quantity $m$ is stepped off in Fig. A on the vertical axis of co-ordinates, the cost $f(m)$ must be stepped off in horizontal direction so that this axis of $f(m)$ coincides with the axis of $p$ (except that in order to keep the diagram free from confusion it has been stepped off to the left of $O$ whereas the axis of $p$ runs to the right).

#### B. The Three Species of Earnings.

##### 1. Gross Income.

2. We now assume first that we have only one product (no by-products) and a system of charging according to the cost-of-service principle, which means every unit is sold at the same price $p$ as every other unit. The number of units sold is then $m$ and the total gross income $b$ is given by the product of the unit price and the quantity sold:

$$b = mp = \text{area } OMLP \text{ (Fig. A)} \quad \ldots\ldots (3)$$

A certain gross income $b$ will belong to every price $p$ and if we step off the gross incomes $b$ as ordinates over the abscissae $p$ we get the curve $b$, which will intersect the axis of abscissae ($p$) in the origin of the system of co-ordinates because there one factor of the product $mp$ is zero; on the other hand, for $p=p_{max}$, that is if the price has become so high that the last sales have just dropped out, the gross income will also become zero because then nothing will be sold ($m=0$). The curve $b$ must therefore necessarily have at least one maximum between these two points[2]. This maximum is $b_{max}$ with the corresponding price[3] $p_0$ as abscissa[3].

##### 2. Net Income.

3. As regards the net income we have to deduct the cost $s$ from the gross income $b$ and in order to do this we have to transform the curve $s=f(m)$ (see left-hand portion of Fig. A) from the abscissae $m$ to the abscissae $p$ (right-hand portion of Fig. A) so that $s=\phi(p)$. A definite value

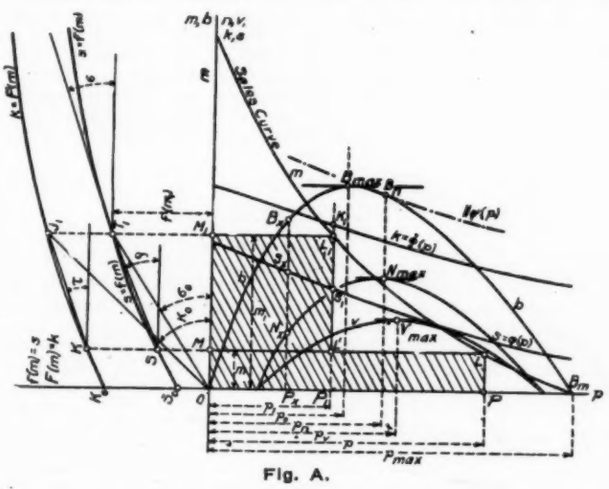



Fig. A.

of $s$ corresponds to every price $p$. We can therefore construct the curve $s=\phi(p)$ with $p$ as abscissa, as is done in the right-hand portion of Fig. A. For instance, for the abscissa $p_1=OP_1$, we find $m_1$ from the sales curve $=P_1L_1$ and read from the $f(m)$ curve the corresponding value $s_1=f(m_1)=M_1T_1$. If we step this off vertically upwards from the point $P_1$ we get the point $S_1$ as a point of the curve $s=\phi(p)$.

Deducting now the ordinates of the curve $s=\phi(p)$ from those of the curve $b$ leaves the ordinates of the curve of the net income $n$. The ordinates of the area between the curves $b$ and $s=\phi(p)$ (for instance $S_xB_x$) indicate by their length the net income $n$ in dollars per year. These ordinates are also stepped off in Fig. A from the axis of abscissae upwards, as $P_xN_x=S_xB_x$, thus furnishing the curve of net income $n$. If we shift the curve $s=\phi(p)$ parallel to itself upwards until it just touches the curve $b$ (at point $B_n$) the abscissa $p_n$ of the tangential point gives the price for which the net income is a maximum; the corresponding ordinate of the area between the $b$ and $\phi(p)$ curves gives the amount of this maximum $N_{max}$ of the net income. Now curve $\phi(p)$ necessarily shows a steady decline with increasing abscissae[4]. The

[2]Whether we have one or more maxima depends on the shape of the sales curve. The footnote of Section 22 of this Insert gives a condition for this shape under which condition the gross-income curve can have only one maximum.

[3]Erratum: In Fig. A designated by mistake as $p_0$.

[3]The case that the income curve has more than one maximum is treated later in this Insert, Section 22 et seq.

[4]The slope of the curve $s=\phi(p)$ is given by the derivative $ds/dp$ and this can be written in the form $ds/dm\ dm/dp$. Owing to fact No. 3 of Section 1 of this Insert, $ds/dm$ is always positive, and owing to fact No. 1 the term $dm/dp$ is always negative. Consequently $ds/dp$, being the product of the two, must always be negative; this means that the curve $s=\phi(p)$ must be continually sloping downwards with increasing abscissae $p$.

The same can be proven in exactly the same manner for the curve $k=\Phi(p)$, see Sections 4 and 6 of this Insert.

price $p_b$ which furnishes a maximum of net income is therefore greater than that which furnishes a maximum of gross income because, owing to the slope of the $\phi(p)$ curve, the tangential point just mentioned must lie to the right of the point $B_{max}$ which indicates the maximum of $b$-curve.

### 3. *Rate of Return.*

**4.** Proceeding to the rate of return (interest, dividend), we first enter the values of the capital invested as a function of the prices in the same manner as this has been shown above for the net income and thus get a curve $k=\Phi(p)$ which has a similar character as the $\phi(p)$ curve[5].

By entering for every single abscissa $p$ the ratio $n/k$ in per cent we get the curve of the rate of return $v$ in Fig. A. This curve again has a maximum because its ordinates must be zero where the ordinates of $n$ are zero. This maximum occurs at the point $V_{max}$ and the abscissa $p_v$ belonging to that point is the price which brings about the best rate of return under the assumed conditions.

By placing equal to zero the first derivative with respect to $p$ of the term $v=\frac{n}{k}$ we arrive at the result that $v$ becomes a maximum if $\frac{dn}{dk}=\frac{n}{k}$, that is, if $\frac{dn}{dp}=\frac{n}{k}\frac{dk}{dp}$. On the right side of this equation $n$ and $k$ are essentially positive values and $dk/dp$ is essentially negative (see footnote to Section 3 of this Insert). If therefore $v$ becomes a maximum, $dn/dp$ is negative. This means that at that point the $n$-curve is already declining; it has gone through its maximum. *The price $p_v$ which furnishes a maximum of the rate of return is therefore higher than that which furnishes a maximum of net income and the latter price,* as has been shown above, *is higher than the price which furnishes a maximum of gross income;* that is

$$p_v > p_n > p_b$$

### 4. *Summary.*

**5.** Each one of the three curves of "earnings" (gross income, net income and rate of return, see Section 70 of the main text) will therefore rise from zero value with increasing prices to at least one maximum and then drop to zero again. We thus have two branches of each curve, a rising left-hand one and a falling right-hand one. Consequently we can attain the same amount of earnings with at least two different prices, one on the left and the other one on the right branch. The former price is smaller than the price at which a maximum of the respective earnings is obtained and the latter larger. As long as we are on the left-hand branch an increase of the price will result in an increase of the earnings, whereas on the right side every increase of the price will reduce the earnings. If we cannot hit the price where the maximum earnings are obtained, we will of course generally prefer the price on the left branch of the curve to the corresponding price on the descending right-hand branch.

## C. THE FINANCIAL EFFECT ON THE PRODUCER AND THE CONSUMER OF AN INCREASE (OR DECREASE) OF THE COST OF PRODUCTION.

**6.** The above methods of representing sales, cost and earnings give a good insight into the problem of finding to what extent the producer and the consumer relatively are the losers in case the cost of production is increased, for instance by taxation, a rise of the cost of labor or material, etc. The producer complains at such times about the high cost of production, whereas the consumer is liable to retort more or less hotly that the producer anyway simply loads the burden of increased cost on the consumer's shoulders, thus leaving his own profit unimpaired, if he does not use the increase of cost as a pretext for even raising the prices so high that his profit is increased. A little investigation into the situation may therefore be of interest.

If the unit cost is increased by a certain fixed amount, the total cost $s=f(m)$ is raised by an amount which is proportional to the quantity $m$; in other words, the curve $s$ in the right-hand part of Fig. A will not only move higher up but it will also become steeper. The net income will become smaller than it was before for every price and consequently the maximum net income will also be reduced from its original value. Moreover, the maximum of the net income will take place at a higher price than before the cost was raised, because the point at which the $s$-curve, if shifted upwards parallel to itself (see Section 3 of this Insert), just touches the gross income curve, will lie more to the right than before on account of the greater slope of the $s$-curve.

The price we have to charge in order to obtain the maximum of the rate of return will also be higher than it was originally, as can be shown in the following way. If $c_0$ is the amount by which the unit cost has been raised, the total cost will be increased to $s+c_0m$ and the net income $b-s$ reduced to $b-s-c_0m$. The rate of return $v=\frac{b-s}{k}$ is reduced to $v_m=\frac{b-s-c_0m}{k}$. The slope of the curves $v$ and $v_m$ referred to the axis of abscissae $p$ is determined by the first derivatives of $v$ and $v_m$ with respect to $p$:

$$\frac{dv}{dp}=\frac{k\left[\frac{db}{dp}-\frac{ds}{dp}\right]-\left[b-s\right]\frac{dk}{dp}}{k^2}$$

$$\frac{dv_m}{dp}=\frac{k\left[\frac{db}{dp}-\frac{ds}{dp}-c_0\frac{dm}{dp}\right]-\left[b-s-c_0m\right]\frac{dk}{dp}}{k^2}$$

If now we let $dv/dp=0$, that is, if we choose the abscissa $p$ so that $v$ becomes a maximum, we find, by substituting $dv/dp$ from the first one of these two equations into the second one, the following special value for

$$\left(\frac{dv_m}{dp}\right)_{v=max}=\frac{-kc_0\frac{dm}{dp}+c_0m\frac{dk}{dp}}{k^2}=-c_0\frac{k\frac{dm}{dp}-m\frac{dk}{dp}}{k^2}$$

$$=-c_0\frac{d\left(\frac{m}{k}\right)}{dp}$$

$$=-c_0\frac{d\left(\frac{m}{k}\right)}{dm}\cdot\frac{dm}{dp}$$

Now $k$ is a function $[F(m)]$ of $m$ and $m/k$ is the cotangent of the angle $k_0$ between the axis of abscissae and a straight line drawn from the origin of co-ordinates to a point on the curve $k=F(m)$, see left-hand portion of Fig. A. From the properties of the $F(m)$ curve (see fact No. 4 of Section 1 of this Insert) it follows that this angle $k_0$ is continuously decreasing for increasing $m$ and therefore the cotangent of the angle $=m/k$ is continuously increasing. This means $\frac{d(m/k)}{dm}$ is necessarily always positive; $dm/dp$, on the other hand, owing to fact No. 1 of Section 1 of this Insert, is always negative so that $\left(\frac{dv_m}{dp}\right)_{v=max}=-c_0\frac{d\left(\frac{m}{k}\right)}{dm}\cdot\frac{dm}{dp}$ has necessarily the same sign as $c_0$. If $c_0$ is positive, that is, if the cost of manufacturing increases, then the term $\left(\frac{dv_m}{dp}\right)_{v=max}$ is also positive, which means that where $v$ is a maximum the $v_m$-curve (plotted over the abscissae $p$) is sloping upwards, and it reaches its maximum at a higher price than $v$ does.[6]

We see from this—using the term "profit" to include both net income and rate of return—the following to be true:

An increase in the cost of production will raise the price which produces a maximum of profit (and conversely a reduction will lower it). On the other hand, the value of the maximum itself is reduced by an increase in the cost of production (and conversely increased by a reduction), as can be easily understood from Fig. A.

*A.* Supposing now first that the producer have no other considerations to follow in determining his prices than to always obtain a maximum of profit, and supposing further that he had a full knowledge of the sales, cost, and capital-curves as given in Fig. A, then he will as a consequence of

[5] The capital invested depends on the selling price. If the selling price is lowered, a larger amount of the commodity (for instance, electrical energy) will be sold, therefore a larger amount must be manufactured. The manufacturing plant (central station, also transmission lines, etc.) must be extended and this requires in its turn an enlargement of the capital invested.

[6] A decrease of the quantity produced does not release any portion of the capital $k$ tied up in the enterprise. The rate of return will therefore in this case change theoretically the same as the net return, since the capital will be constant. We can assume, however, at least in the central-station business with which we are chiefly concerned here, that the natural growth of the business will take up the decrease of the necessary capacity; in other words, that the effect of the increase of the cost of production, as far as the capacity is concerned, is simply a retardation of the growth of the capacity. If $c_0$ is negative, that is, if the cost of production is reduced, the above formulas for the rate of return apply without any restricting assumptions.

an increase of cost raise his unit price from the amount which resulted in a maximum profit under the original conditions of cost to the price which results in a maximum of profit under the new conditions of cost. The unpleasant effect of the advance of the cost of production will therefore be divided between the producer and the consumer in some ratio; the consumer will have to pay a higher price and the producer will get a lower profit. It is impossible for the producer to shift the entire burden of the increase of the cost onto the shoulders of the consumer. Moreover, the producer sees his chances reduced of investing new capital in his growing business. Conversely, if the cost of production is reduced, the producer cannot reap all the benefit alone, it is to his best interest to let the consumer participate by reducing the prices.

*B.* In practice the details of the shapes of the sales, cost, and capital-curves as represented in Fig. A are not known and we can make only rough guesses at the course these curves take. This and other reasons make it possible or even probable that the vendor (producer) has fixed the price not just at that amount which would yield him a maximum profit. Generally, as pointed out in the preceding section (5) the tendency will be to keep the price below that optimum value rather than above it. In that case it will be possible to shift a larger portion of the cost increase onto the shoulders of the consumer than under *A* above, and if the price has been sufficiently below the amount which resulted in a maximum it will be even possible for the producer to maintain his profit at the original level. It may even happen that the result is an increase of the profits. Owing to our ignorance of the details of the curves it will obviously always be a matter of chance which one of these three contingencies will take place.

*C.* If the price should have been higher than that which results in a maximum of profit from the beginning, it is possible that even after an increase of cost a price reduction remains advisable from the producer's standpoint so that both the producer and the consumer would be benefited by an intelligent downward revision of the price. But it should not be overlooked that this is the case not *on account of* the raise of the cost but *in spite of* it and that the benefit would have been greater to both parties if the increase of the cost of production had not occurred. Moreover, the raise of the cost of production will in no way reveal the fact that the price has been (and still is) too high. The remedy for the decrease of profit will be sought in an increase of the prices instead of in a reduction.

*(To be continued.)*

## COMPLETE SAFETY EXHIBIT DURING SAFETY CONGRESS AT CLEVELAND.

**Demonstration of Approved Shop Lighting to Be Made Among Exhibits of Safety Devices, Guards, Appliances, Etc., from October 1 to 4.**

The most complete collection of commercial and non-commercial safety guards, appliances, devices and accident-prevention data ever arranged in the history of the National Safety Council will be shown at the exhibit to be held at Grays' Armory in Cleveland, Ohio, Oct. 1 to 4, inclusive, in conjunction with the eighth annual Safety Congress of the National Safety Council.

Every foot of space at the armory has been contracted for. There will be 70 booths in which will be shown types of safety equipment applicable to every industry. The exhibit will be given under the auspices of the National Safety Council and the Safety Institute of America, and 350,000 cards of admission to the exhibit will be distributed among the delegates to the Safety Congress and workmen of the plants in and around Cleveland.

An unusual shop-lighting exhibit will be conducted by the National Lamp Works, Nela Park, Cleveland, to which has been assigned the entire stage of the armory. This company will show a shop in operation, with three lighting installations, one poor, one mediocre and one ideal from the point of view of safety engineering. The light will be flashed on and off alternately, while the advantages and defects of the different systems will be explained. This exhibitor will also show a model office and model drafting room with indirect lighting installations.

There will be several safe clothing exhibits, including a special live model display of safe clothing for women and girls in industry. Sanitation and recreational facilities at industrial plants also will be shown. The round table and sectional meeting discussions at the last annual congress of the National Safety Council at St. Louis disclosed the need for a complete collection of the mechanical aids to safety work as an adjunct to the Safety Congress.

Gray's Armory at which the safety exhibit will be held in Cleveland is about two blocks from the Hotel Statler where the sessions of the congress will be held. The exhibit will be open from 11 o'clock in the morning to 11 o'clock at night, to make it possible for men and women who come to the Safety Congress to visit the exhibit without missing any of the sessions.

Among the other features to be shown for the first time in connection with a Safety Congress will be an Americanization exhibit, an industrial housing exhibit and a women in industry exhibit supplied by the United States Department of Labor, Women in Industry Service. The exhibit of the eighth annual Safety Congress will also be unique in the extensive display of non-patented or so-called home-made mechanical safety guards.

## DETECTION OF OIL SOURCES CLAIMED BY ELECTRICAL MEANS.

Locating crude petroleum by means of an electrical device, no matter how far beneath the earth's surface the product may be, has been successfully done in the shallow field near Corsicana, Texas, during the last few weeks, according to reports, and Eugene Elkins, the inventor of the instrument, has gone to the outlying district around Burkburnett to make further practical tests of what is claimed to be a very remarkable invention. The oil industry may be revolutionized if oil pools can be located by means of so simple an instrument. The principle upon which it works is described by Mr. Elkins as follows:

"The system consists in forming an electrical circuit through the earth by dropping an insulated wire to the bottom of a dry water hole, valley or indentation and placing a series of batteries on top of the earth, to the positive pole of which is attached a land wire. This land wire is then taken out over the field in any direction and for any distance and all of the intermediate territory is combed thoroughly with electric currents flowing from the anode or positive pole to the cathode or negative pole. The earth being simply a huge inverted magnet, the electric currents travel from one to the other of the charged poles by the path of least resistance, much as does the return current of the telegraph system through its ground wires to the point of origin. That system also proves that the principle of earth conductivity of electricity is absolutely correct.

"Oil and its constituent components being the only minerals in the earth through which electricity cannot pass, it therefore follows that an oil pool in the path of the electric currents mentioned will offer a great resistance to the said currents, forcing them to go around the pool and also resulting in an appreciable loss of current through electrolysis, both of these factors registering these resistances on an extremely delicate meter in the hands of the operator on the surface of the earth."

# Delivery of High-Tension Service to Large Consumers

## General Considerations Involved—Relation of Cost to Station Capacity and Revenue—Choice of Equipment—Metering

By RAWSON COLLIER

*Operating and Sales Manager, Georgia Railway & Power Co.*

IT IS often difficult to decide whether the ideas of the sales department or the operating or engineering department should prevail when it comes to the delivery of certain types of service to the customers. Until recent years, the majority of the large consumers on the lines of our central stations were located in the congested districts of our cities, where they were supplied either from underground alternating-current or direct-current feeders, at low voltage, or from semi-high-tension distributing lines, through manhole or vault-type transformers. In these cases, the construction details were practically standard, following closely the rules for such service prescribed by the insurance underwriters. Usually, standard manhole type transformers were used, and the only engineering details that sometimes called for special study were those covering ventilation and drainage in the manhole or vault.

Metering was generally done at low voltage, and the practice generally was for the central station to furnish, install and maintain the necessary transformers, the rates quoted being supposed to cover all the various items entering into this type of service.

When the utilities began to build out from the cities, with their high-tension transmission lines, and delivery at the customers' premises was often made at from 6000 to 44,000 volts, new problems at once presented themselves to the sales manager as well as to the engineer.

In the case of large consumers, it was almost always the case that central-station energy had to compete with isolated steam plants, in production cost, and, as the larger the consumer the lower his isolated plant generating cost per kilowatt-hour, so the unit price of central-station energy had to be lowered and every inducement had to be offered to the prospective customer in order to get this business. It is certain that a careful study of many existing large contracts between manufacturers and central stations will show that the customer is buying current at less than its actual delivery cost to the central station, simply because the central station was too eager to obtain "big business" and failed to take into consideration the fact that the unit cost per kilowatt-hour on long distance transmission lines and step-down substations and the current loss in such transmissions and transformations should play an important part in deciding whether or not the rate obtained from the consumer was a profitable one.

I know of no case where current is delivered to ordinary wholesale commercial customers at a voltage exceeding 44,000 where the reduction to usable voltage is handled by the consumer. This is doubtless the limiting delivery voltage at present, as it is about the highest voltage for which standard high tension customers' transformers are being built in moderate sizes and it is practically the limiting voltage for standard moderately priced oilbreak and disconnecting switches and for customers' primary watt-hour metering outfits.

Generally, in serving a manufacturing center, if remote from the generating station, the central station finds it advisable to transmit at high voltage to a central point, where a line distributing bank of transformers is installed, from which the district is served through high tension customers' feeders, operating at voltages ranging from 19,000 to 44,000. Some companies operating in moderately populated territories have found it advantageous to operate lines at 38,000 to 44,000 volts of as much as 60 miles in length, the service being perfectly satisfactory for total connected loads as high as 6000 kv-a., with momentary demands of 4000 kv-a. Over such a line under ordinary circumstances, there will be delivered during the year approximately 10,000,000 kw-hr. The data from such a line in actual operation shows that the total cost of transformers and stations installed is approximately $100,000. Interest, depreciation and upkeep on these transformers represents approximately $20,000 per year. If the company had to own and operate these transformers, its delivery cost per kilowatt-hour to the customer, due to overhead and maintenance charges on transformer stations, would be increased approximately two cents.

The customer in figuring his isolated plant construction and operation cost should start with his coal bunkers and his coal pile, and figure the cost of his finished power from this point through to the point where it is used. Is it not correct, therefore, that in figuring the cost of purchased electric power to the same consumer, that he be expected to pay for and maintain everything from the high tension line (the crude power) to the point where the power is used? This would place the delivery to all wholesale customers, on the same basis and the customer would bear the expense of changing the current as received to any voltage that he might desire for his operation. The objection might be advanced that the average customer is not prepared to maintain and keep in repair a high tension transformer station, but this can easily be handled by the company furnishing free periodic inspection service on the customers' station, and the customer paying for all necessary work that the company does on the station, in order to keep it in first class condition.

At this time, I have been able to obtain the ruling of only one Public Service Commission on the subject of who should furnish the high tension station. It is in general, as follows: "In the opinion of the commission, a company attempting to serve the public with a particular kind or class of service should furnish all the instrumentalities for so doing. However, in view of the fact that the customer has it in his hands en-

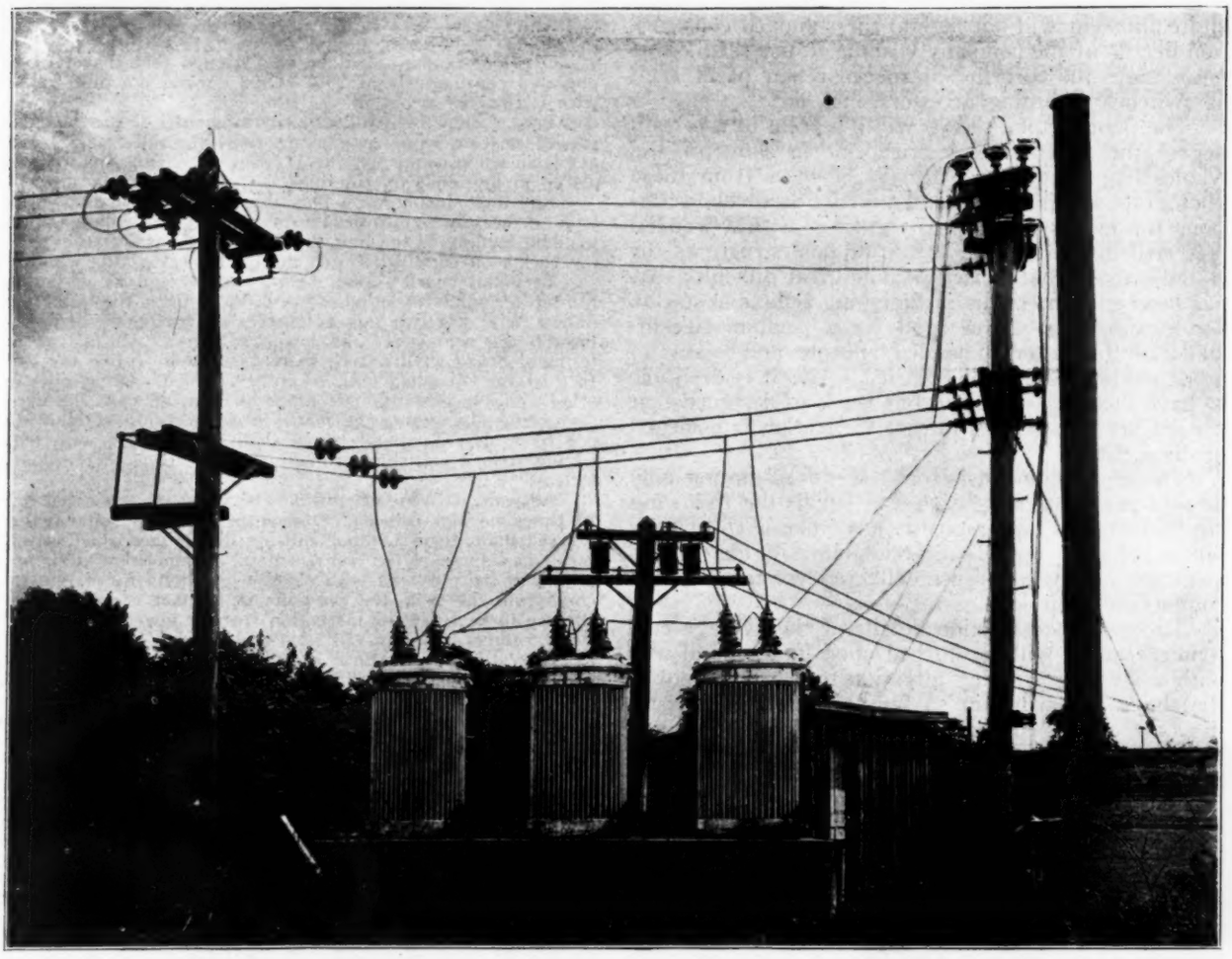


Fig. 1.—Early Type of Pole Structure for 600-Kv-a. Transformers, Transforming from 22,000 to 2300 Volts. Metering on 2300-Volt Side.

tirely as to the length of time that he (the customer) shall use the service of the company, and in order to protect the public from the company's making an unwise expenditure of money in furnishing a particular type of transformer to meet the peculiar needs of any individual customer, and such particular customers later deciding after a short trial to go back to isolated plant operation, the commission therefore holds that the customer should provide the transformers."

Fortunately for the sales department, where the customer is a large one and where the current sales rate of necessity must be low in order to obtain the business, it is found that the cost per kilovolt-ampere of transformer capacity, rapidly diminishes as the station grows larger, and the load-factor is generally higher for large than for small consumers. These two facts, therefore, tend to reduce the increase in the cost per kilowatt-hour to the large consumer where he owns the step-down transformer station and where he actually adds to the rate paid for electricity, the overhead and operating costs of his step-down transformer station. The following table illustrates the point.

| Size of station. | Transformer cost. | Transformer cost per kv-a. | Total station cost per kv-a. | Yearly expense, station maintenance. | Yearly kw-hr. | Yearly maintenance expense per kw-hr. |
|---|---|---|---|---|---|---|
| 45 ..... | $1215 | $27.00 | $36.00 | $ 324 | 74,000 | 0.43c |
| 150 ..... | 1920 | 12.80 | 18.00 | 540 | 200,000 | 0.27c |
| 1000 ..... | 5100 | 5.10 | 14.76 | 2561 | 3,200,000 | 0.08c |
| 2000 ..... | 8200 | 4.10 | 12.50 | 4000 | 6,000,000 | 0.07c |

If, therefore, the customer is to be expected to furnish the substation and if the upkeep and overhead costs of the station are to be charged by the customer against his power cost, the closest co-operation between the sales department and the engineering and operating departments will be needed, both in the design and in the operation of the station, as the yearly station overhead and maintenance expense must be kept down if the business is to be obtained and retained.

The best design for a customers' transformer station has been carefully studied by a number of the larger companies, during the past few years, the idea being to build the cheapest station possible consistent with first-class engineering practice. Early designs of stations show a leaning towards wooden pole structures, but it was soon found that this was unsatisfactory except for small unimportant stations. Repairs and upkeep on the wooden structures were frequent and it often became necessary to interrupt the customers' service in order to replace burned off pins or crossarms, or to replace poles. Naturally, therefore, the design drifted to a steel or iron structure and immediately the installation cost per kilovolt-ampere and consequently the unit kilowatt-hour cost covering interest and upkeep increased greatly. No standard substation design of moderate cost and of substantial and flexible construction has been brought out. There are several designs of "ready built" structures on the market, but as a general proposition they are comparatively expensive, and in many cases their design

and equipment will not fit into the standard construction details of the company wishing to use them. This necessitates the carrying of special repair parts, such as switches, lightning arresters, etc., etc.

The photographs shown will illustrate to a certain degree the practice as carried out in some of the wholesaling companies. It will be seen from these photographs that the general practice is to build stations for installations up to 100 kv-a. with a wooden pole structure, using angle iron or pipe structures for stations above that capacity. The great difficulty that has been encountered is in designing a flexible station —a station that can be used for a medium size installation but later expanded cheaply and easily to accommodate additional capacity. Also it is desirable to have the steel work and bus work so designed that it need not be scrapped in case the station is enlarged or discarded.

The ideal high tension customers' substation may be said to be that substation that fulfills the following requirements: Low first cost, low upkeep cost, flexibility, safety in operation, accessibility of meters and switches, ability to adjust delivered voltage between commercial variations.

The main construction details of the average customers' station will be touched upon in a general way with a view of drawing attention to the three points that have a bearing, in so far as customers' substations are concerned, on the delivery of continuous and satisfactory service.

### Transformers.

For moderate sized stations, oil-insulated, self-cooled transformers will prove most satisfactory. Such transformers may be specified to meet the standard A. I. E. E. specifications; some companies, however, are requiring special taps, special voltage tests, etc., etc. I quote as follows from a report made by one large company regarding their specifications: "We follow fairly closely the A. I. E. E. specifications except that the temperatures are based on 35° instead of 50° rise; voltage tests practically the same except on the secondary test, where we demand a higher voltage test. On the 110,000-volt transformers we have 2½% taps in steps from 110,000 to 74,000; on the 44,000-volt transformers we step down to 36,000 volts in drops of 1000 volts."

The specifications covering transformers of another wholesaling company are in part as follows:

*General.*

Use.—Transformers to be used on 38,000-volt "Y" grounded neutral, 22,000-volt and 11,000-volt circuits from substations connected to 110,000-volt transmission lines. Transformer will not be used in connection with choke coils. Transformer to be oil insulated, self cooled.

*Tanks.*

Fittings.—Shall consist of gauge glass, drain valve (located on nameplate side), sampling valve (located at bottom of tank and brought out opposite drain valve, size ½ in.), filtering valve (located at top of tank on side opposite drain valve, size ¾ in.). Globe valves to be used throughout, equipped with nickel steel seats and removable hand wheels.

Design.—Shall be such as will permit of convenient handling with jacks and rollers when transformer is assembled in case and case filled with oil. Base of tank shall be provided with lugs or recesses to permit the use of jack or pinch bar without requiring the use of wedges. Shall be provided with eye-bolts or other device for use in fastening slings or hooks with which to facilitate handling fully assembled transformers filled with oil by the use of hoisting or other equipment of like character. These devices shall have ample factor of safety. Base of tank shall be drilled and tapped for ⅝-in. cap screw on nameplate side to provide for ground connection.

Dry Air.—Shall be maintained by the use of anhydrous calcium chloride in proper container which shall be installed at factory on all transformers of 250 kv-a. and over.

*Windings.*

Over-potentials.—Shall be so designed that they may be operated continuously at 20% above normal potential rating with normal kv-a. output.

Taps.—Four 2.5% full capacity taps shall be provided for the 22,000-volt winding, making two 5% full-capacity taps available when connected for 11,000 volts. Taps shall not be placed in line ends of windings.

End-turn insulation.—The high-tension winding shall have a heavily reinforced insulation on each end of the winding leading to the line, this reinforced insulation extending back to a depth of 5% of the total turns of the winding.

Terminal board.—Shall be of such design as to permit the tap terminals to be placed in straight lines, the outer terminals being for the high voltages and moving the straps in toward the center for the lower voltages. All fittings on terminal board shall not be more than 12 in. below the surface of the oil when tank is properly filled. Wing nuts or other suitable terminal fastenings shall in all cases be used, permitting changes to be made in connections without the use of tools. Terminal board shall be provided with fiber edging strip which shall project above the edge of the board at least ½ in.

Assembly.—Winding and core shall be so assembled that 20 times normal full-load current may be momentarily impressed upon them without causing distortions which would result in damage to the transformer. Assembled winding and core shall be provided with suitable eye-bolts for lifting the core from the tank, the eye-bolts to be near enough the oil surface to be found by inspection without lowering the oil.

*Temperatures.*

Operating temperatures shall be determined in accordance with A. I. E. E. Standardization Rules, edition October, 1916.

*Factory Tests.*

Shall be made in accordance with A. I. E. E. requirements for this class of apparatus.

*Oil.*

Assembled transformers shall be filled with the proper amount of the best grade of transformer oil, this oil to be placed in the transformer case at a time in the assembly or final test of the transformer which is found to be productive of the best results in securing the maximum insulating value.

*Transportation.*

Transformer shall be shipped from factory with full amount of oil in transformer tank; equipped with calcium chloride container connected properly and filled with proper amount of calcium chloride; all necessary valves, thermometers and oil gauges installed and ready for service; with or without bushings as conditions may require; with proper protection from damage from handling during transit.

The manufacturer must guarantee the following condition of transformer upon its arrival at destination: Mechanical and electrical condition perfect, the oil to be free from moisture and of a dielectric strength equal to a test of 40,000 volts, frequency 60 cycles, between two ½-in. smooth disks with a separation of 0.2 in.

Purchaser agrees to draw ½ pint sample of oil from the bottom of each transformer tank as soon as it arrived at destination and forward to the manufacturer for test.

### Foundations.

(For all except pole-type stations.)

Concrete foundations to extend well above any possible high water line. It is much cheaper to handle, test, change or filter a transformer if it is kept near the ground, therefore the placing of large transformer on steel or wooden structures high above the ground is to be discouraged.

### Switches.

Disconnecting switches should be installed on the high-tension side of the transformers. Preferably these switches should be operated from the ground by suitable lever, which can be kept locked, if customer desires. By the use of these switches the customer can disconnect the station from the line when the station is not in use or when there is work to be done on it. The low-tension side should be equipped with suitable oil-break switch, equipped with overload and no-voltage release coils.

### Lightning Arresters.

This item is extremely difficult to handle, especially if the station is placed in an isolated locality where

competent help can not be obtained. Electrolytic lightning arresters are expensive and need daily attention, therefore are used on only the large and expensive stations. Horn-gap arresters, while of some assistance, do not afford perfect protection. There are a number of other types of arresters on the market but all seem to have faults, and trouble from lightning coming into the station from the line side seems to be always with us. To illustrate the different ideas now followed out by various stations, I will quote from several letters received by me.

A report from one operating company says: "Our lightning protection is left to the ground wire on the transmission system and choke coils at the substations." Another company reports: "We no longer place faith in fused horn-gap lightning arresters on 11,000 to 38,000-volt lines. We have bridged our fuse gaps with heavy copper wire and now treat the customers' substation as a part of the semi-high-tension distributing system. We find that we have fewer interruptions to the customers' service."

On the low-tension side, if necessary, lightning protection can be obtained by a number of well-known low-tension arresters.

### Metering Equipments.

Metering seems to be almost universally done on the low-tension side of the transformers. Some companies established the rule of metering on the high-tension side at voltages ranging from 11,000 to 38,000 but later a few of those companies decided to stand the transformer losses and meter on the low-tension side of the transformers rather than pay the large difference in the cost of the high-tension metering outfits and chance the increase in maintenance cost, due to the high-tension outfit being destroyed by lightning.

The accompanying table shows the difference in cost to one operating company in high-tension and low-tension metering, the data covering four years' operating:

| Kv-a. capacity of transformers. | Cost of meter installation. high-tension voltage. 11,000/22,000 | low-tension 550 | Maintenance per yr., high tension. | low tension. |
|---|---|---|---|---|
| 100 | $762 | $225 | $60 | $3 |
| 500 | 762 | 225 | 60 | 3 |
| 1000 | 762 | 225 | 60 | 3 |
| 3000 | 762 | 225 | 60 | 3 |
| 3000* | 1600 | 225 | $400 | $3 |

*22,000/38,000 volts.

Transformer Loss to Central Station by Metering on Low Side (Approximate).

| 11,000/22,000 volts. | Kw-hr.per year. |
|---|---|
| 100 | 17,000 |
| 500 | 86,000 |
| 1000 | 173,000 |
| 3000 | 520,000 |
| 3000* | 520,000 |

*22,000/38,000 volts.

### Maximum Demand Meters.

A large number of companies now make a rate consisting of a charge per kilowatt of maximum demand, plus a charge per kilowatt-hour. To obtain the

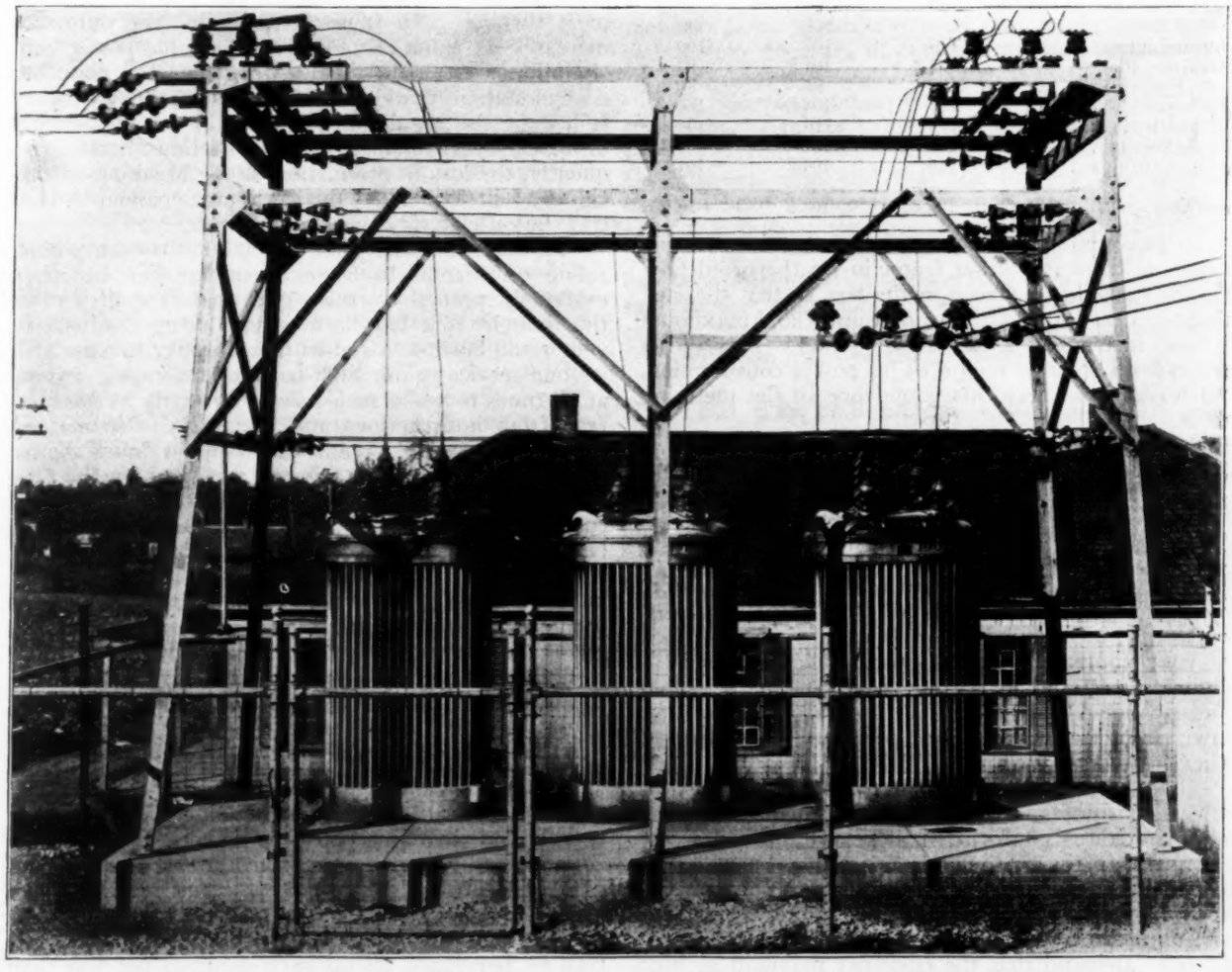


Fig. 2.—Modern Type of Outdoor Installation, Showing Three 150-Kv-a. Transformers With 2300-Volt Metering.

data for the maximum demand charge, a number of types of instruments are available. Curve-drawing instruments and those of the curve-drawing type are suitable only for mounting indoors and can therefore only be used where an indoor type station is used or where the instrument is mounted on the buss bars on the customers switch board. There are several types of indicating maximum demand instruments suitable for mounting out of doors in a weatherproof box and connected directly to the watthour instrument. These instruments are low in first cost and upkeep, and commercially accurate.

From time to time the question has been agitated by the customer and by rate experts, as to the effect of the varying lengths of time that should be allowed for registering the maximum demand. To determine the actual effect of the varying maximum demand time limit, tests were made on a number of customers, operating various types of manufacturing plants, the results being based upon observations taken from graphic recording wattmeter charts, comparing the result of the average of four 5-minute demands during any four days in the month, with one 15-minute demand, one 30-minute demand and one 60-minute demand. The results obtained, were as follows:

| Type of industry | Number of customers | 15-minute demand | 30-minute demand | 60-minute demand |
|---|---|---|---|---|
| | | In percentage of four 5-minute demands | | |
| Abbatoir ..... | 2 | 107 | 103 | 99 |
| Barytes and Ochre Mines .. | 5 | 101 | 98.5 | 96 |
| Bed Mfgrs. ..... | 1 | 114 | 111 | 105 |
| Chair Factory .. | 1 | 107 | 101.5 | 97 |
| Cotton Mills .... | 4 | 102 | 101 | 99 |
| Cotton Linters .. | 1 | 110 | 107 | 100 |
| Fertilizer Plants. | 3 | 104.2 | 101.2 | 93.4 |
| Iron Foundries.. | 2 | 99 | 95 | 85.5 |
| Municipal Plants | 5 | 107 | 104.5 | 100 |
| Oil Mills ..... | 3 | 118 | 110 | 106 |
| Oil Refinery .... | 1 | 102 | 100 | 100 |
| Stone Crushing.. | 3 | 110 | 104.2 | 101.5 |
| Average ..... | 31 | 106.8 | 103.1 | 98.5 |

In passing, it may be mentioned that if metering is done at the transformer frame in weatherproof box, windows should be placed in the box so that the customer can read his watthour instrument and maximum demand instrument whenever he wishes. This allows him to keep accurate record of his power consumption, and tends to increase his confidence in the metering outfit.

### In General.

The following suggestions are made with a view of calling attention to points that may aid in giving continuous and satisfactory service to your high-tension customers.

(a) Insist that transformers, lighting protection, and switches on the station, installed by the customer, shall conform to standard specifications as prescribed by your company. By so doing you will tend to eliminate any undue weakness in the station, that might cause a short circuit or ground and thus shut down your transmission line and cut off service to other customers.

(b) Standardize on one or two voltages for your power consumers, and insist that transformers and other apparatus conform to these voltages. In case of trouble to the customers' apparatus, you will then be in a position to make quicker repairs, or you can lend from your stock, transformers, motors, switches, etc., until the damaged apparatus can be repaired.

(c) Demand that the customer maintain as high power-factor as is consistent with first-class engineering and operating. If his type of machinery, or his operating methods tend to reduce the power-factor below that allowable for first-class operation, require the customer to install necessary machinery to rectify the trouble.

(d) Make periodic inspections, free, of the customers' transformer station and if trouble is found, notify him immediately and make repairs promptly, at his expense.

(e) Generally, the customer will desire that his transformer station be erected by your company. If so, design and build him the most economical station possible, taking into consideration, first class engineering and operating.

(f) If possible, do all work on your customer's station without interfering with his operation. If your company does not do live line work, try to make repairs or changes on Sundays, nights or holidays, first always getting permission from the customer in writing before taking the current off his station.

(g) Generally large manufacturing plants desire to know their power costs for each month. Try, therefore, to read the meter on the last day of each month, so that the bills rendered, will cover an actual month's service.

(h) Insist that your customer is furnished the correct voltage for his apparatus, and that the regulation is within commercial limits. Much of your wholesale business is obtained because of the fact that the amount of manufactured product is increased, due to the fact that electrical drive is steadier than the drive obtained from reciprocating engines or even most turbines. In some cotton mills, the output is increased as much as 10% with the same power consumption, due to the change from isolated plants to central-station power. If the voltage or frequency is low or the regulation is poor, this saving quickly disappears. If momentary interruptions occur, frequently, the loss in production or the breaking of machinery will soon cause the advantages gained by central-station electric drive, to disappear.

There is absolutely no doubt but that the wholesaling of current to large consumers can be made extremely profitable, if we give that type of service the thought that has been given during the past to your retail business. Let us therefore try to standardize our service to our high-tension customers, striving at all times to make such service as nearly as possible, free from interruptions and variations. No man in the central-station organization should know better than the sales manager what is necessary in the way of service and equipment, in order to have a satisfied customer. Therefore, only by the closest co-operation between engineering and operating departments and the sales department, can we hope eventually to work out and perfect a standard plan for properly and economically serving our high-tension customers.

The above paper was presented by Rawson Collier before the Sales Managers' Convention, held at Association Island, August 4, 5 and 6.

## AIRPLANES PATROL PANAMA POLE LINES.

Airplanes are now being employed for hunting trouble and patrolling pole lines in the Panama Canal zone, according to advices from the Air Service. In one recent case a seaplane went from Balboa to San Carlos, repaired a line and returned in one hour and fifty minutes, whereas the trip through the jungle trail by horseback would have occupied not less than three days.

## DEVELOPMENTS OF POULSEN WIRELESS SYSTEM SHOWN.

**Expert Evidence for and Against the System Given at the British Marconi Inquiry.**

During the hearing of the claim of the British Marconi Co. against the British Government for $35,000,000, some very interesting evidence, new to English minds probably owing to war-time restrictions on the circulation of wireless technical developments, was given respecting the Poulsen system.

Wm. Elwell, in the course of a detailed statement, said that he was employed by some San Francisco millionaires to investigate all the existing wireless systems and in 1909 he came to the conclusion that the most promising system was the Poulsen. After ascertaining that the rights were for sale, he went to Denmark and had the system demonstrated to him between Lyngby and Copenhagen. He made a contract with the owners to purchase the patent rights for America, and on returning to America he organized the Poulsen Wireless Telephone & Telegraph Co. with a capital of $5,000,000. This company in 1911 was merged into another company known as the Poulsen Wireless Corporation. It was a large company, and to avoid taxation in different states it was reorganized and operated under the name of the Federal Telegraph Co. with a nominal capital. The Federal company built many stations, starting from 5 and 12 kw. which he purchased in Denmark to demonstrate the system. After that date he manufactured arcs of increasing power—15, 30 and 60 kw. In 1912 he built a station in San Francisco and one in Honolulu, which he constructed with 30-kw. arcs, and inaugurated the system which had been spoken of in Lord Parker's report. Towards the end of 1912 he took a 30-kw. arc to Arlington, where he demonstrated to the American Navy that it was superior to the 100-kw. Fessenden spark. He was asked by the American Navy what he would recommend at a station, and his proposition was to put up three 600-ft. towers and install a 100-kw. arc. This contract was signed in April, 1913. That was at Darien, on the Panama Canal. During the demonstrations he showed that with an arc of 100 kw. reliable communication could be given over a distance of 2000 miles. In 1913 he became chief engineer of the Universal Radio Syndicate, who were then building the Danish design stations at Ballybunion and Newcastle, New Brunswick. These were destined for Transatlantic commercial work. He did not design these stations, but he was called in towards the end of 1914 with a view to making them work. He modified the design of the generator and satisfactory communication was carried out. In 1915 he was invited to Paris and for the French Government put up an arc on the Eiffel Tower. In 1916 he put up an arc generator at the Lyons station for the French Army, which has been in work with America, or about 4000 miles, for over two years. In 1917 he went to Rome and designed a plan for communicating direct from Rome to America, a distance of some 4200 miles. In 1918 he installed a still larger arc in the Lyons station. The largest arc he had worked was 405 kw., the communication being over some 3000 miles. He had no hesitation in saying he considered the Poulsen system the best wireless system in use today.

E. H. Shaughnessy, staff engineer to the British Post Office Engineering Department, and in charge of the wireless section, expressed the opinion that the Poulsen arc was at present the best known working system for wireless transmission. It became so at the middle of 1918. He said that the development of the Poulsen arc had been pretty rapid, and larger power arcs had been built in various parts of the world. The plan of the alternative receiving system which had been put in on behalf of the Post Office was perfectly free from any existing Marconi patent. It was quite as efficient as any other receiving system. The Poulsen arc generator for transmitting which was shown on the same plan was fully covered by expired Poulsen patents. An efficient working Poulsen generator could be made to deal with the requirements of the Imperial wireless chain without infringing.

Another witness, H. A. Madge, technical wireless expert to the British Admiralty, said he had been responsible for the general technical planning of over 500 Poulsen installations, mostly for small power, though a dozen were capable of communicating over 1000 to 1500 miles. He held that a Poulsen installation, if properly designed, was more efficient than any wireless spark known to or heard of by him. The largest Poulsen arc installation he had seen working was that at Nantes, of 200 kw. He could design a 200-kw. arc which would be a perfectly practical proposition and thoroughly satisfactory for long distance commercial wireless.

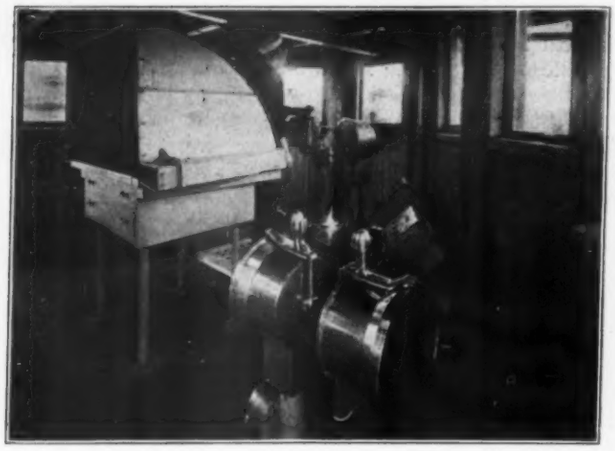
Other evidence was given by Capt. C. R. Payne, R. N., concerning satisfactory experience with the Poulsen system while on British battleships. He said that day and night communication was better by the Poulsen system than by the spark system. Commander J. F. Commerville, R. N., testified to very satisfactory accuracy of transmission and small interference, during practical experience in the war.

The Marconi company followed up the foregoing statements by calling evidence of a different kind from Emile Girardeau, radio officer engineer to the French Government, who said that the Poulsen arc system had not been a success in French stations and very little was left of the original design. He said that neither the French War Office nor the French Navy had been satisfied with the working of the system. He said further that none of the French stations was capable of conducting a regular commercial service, even with the improvements made.

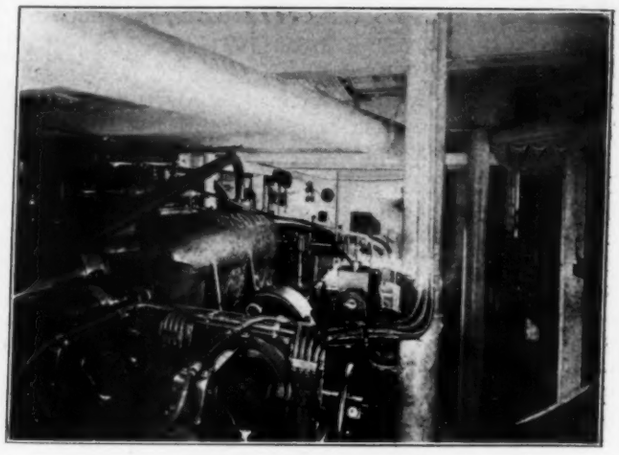
## UNITED STATES COAL PRODUCTION IN 1918.

The final figures of coal production for 1918, compiled from reports from all operators in the country, have just been completed by the Geological Survey. These official figures show for the year 1918 a total output of 579,386,000 net tons of bituminous coal, a figure less by 1.1% than the estimate published 8 months ago. The total production of coal, anthracite, bituminous and lignite, in 1918, was 678,212,000 net tons. Pennsylvania ranked first in output, with West Virginia second and Illinois a close third. The number of men employed in the production of bituminous coal in 1918 was 615,300, compared with 603,143 in 1917. The average number of days worked, the highest recorded, was 294, compared with 243 in 1917.

The total value of the production of the bituminous coal mined in 1918 was nearly $1,500,000,000 and of both bituminous and anthracite coal, $1,828,423,000. The average value per ton realized for bituminous coal was $2.58, compared with $2.56, the estimated weighted average of the established Government prices in effect throughout the year.



Navigating Bridge with Steering Control and Electric Apparatus for Transmitting Signals to Engine Rooms.



View of Steering Apparatus (Chiefly Electrical) Looking Forward—Note Two Motors in Foreground.

## INTERESTING ELECTRICAL FEATURES OF THE BATTLESHIP NEW MEXICO.

**Superdreadnought Flagship of the New Pacific Fleet Has Most Complete Electrical Equipment of Any Ship Afloat.**

It is fitting that the superdreadnought *New Mexico*, probably the most modern of all battleships and the first capital ship of any nation to be operated entirely by electricity, should have been selected as the flagship of our new Pacific fleet now on our Pacific coast.

By many the *New Mexico* has been referred to as the only 100% electric ship, for there is hardly a device on board which does not operate electrically. The special features of her electrical propelling equipment were described in our issue of April 12, 1919. A very brief summary of this feature and some of the other interesting electrical features is given below:

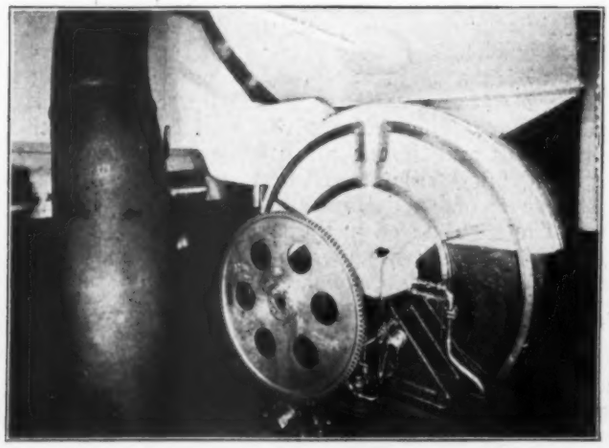
The *New Mexico* is propelled by four 7000-hp. polyphase induction motors each direct connected to a separate propeller shaft. Each motor is 12 ft. in diameter and can operate efficiently at several speeds. These four motors are supplied with current obtained from two special turbogenerators used only for this purpose. The propelling equipment is the product of the General Electric Co., Schenectady, N. Y., which developed it in conjunction with the Bureau of Steam Engineering of the Navy. A view of one of these big motors is shown on page 400.

There are six auxiliary turbogenerator sets located in different parts of the ship which produce the electricity that operates all of the many electrical devices, outside of the propulsion equipment, including power, lighting, heating and signaling apparatus.

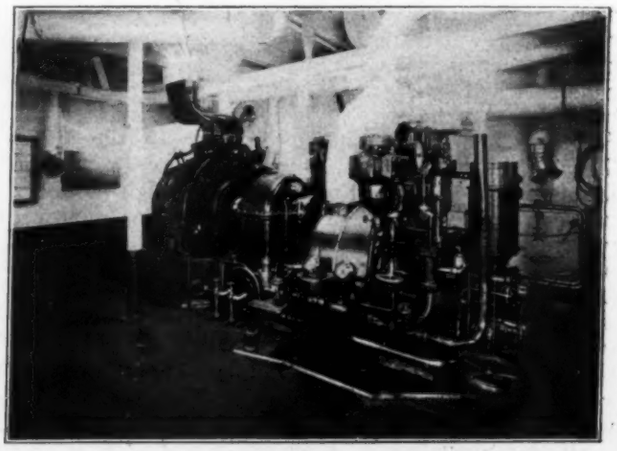
### Some of the Motor Uses.

It has been estimated that there are about 300 motors on the *New Mexico*, and here is a partial list of some of the uses to which they are put:

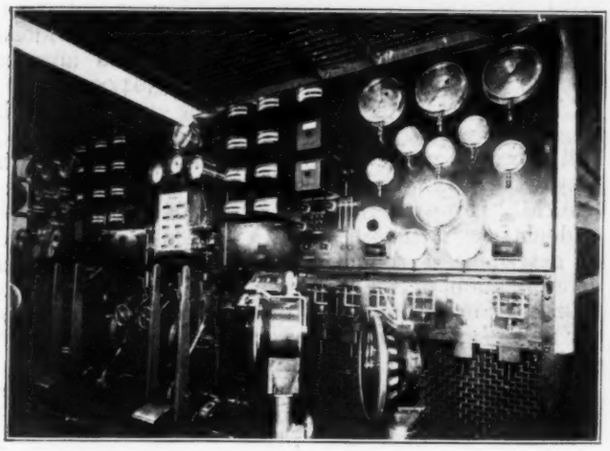
4 motors for steering gear;
2 motors for anchor windlass;
4 motors for boat cranes;
4 motors for deck winches;
1 motor for capstan;
8 turret-turning motors;
12 gun-elevating motors;
4 motors for ramming charges in turret guns;
24 ammunition-hoist motors;
4 smoke-ejector air-compressor motors;
2 torpedo air-compressor motors;
14 motors for operating sanitary, fresh water and drainage pumps;
4 motors for oil pumps;
4 shaft-turning motors;
2 motors for refrigerating system;
80 motors for ventilation fans;
8 motors in kitchen for potato peelers, dough mixers, meat grinders, dish washers, ice cream freezers, etc.
20 motor-generator sets for interior communication, telephone, gun firing, etc.;
6 motors in carpenter shop;
10 motors in machine shop;
7 portable motor-driven drills;



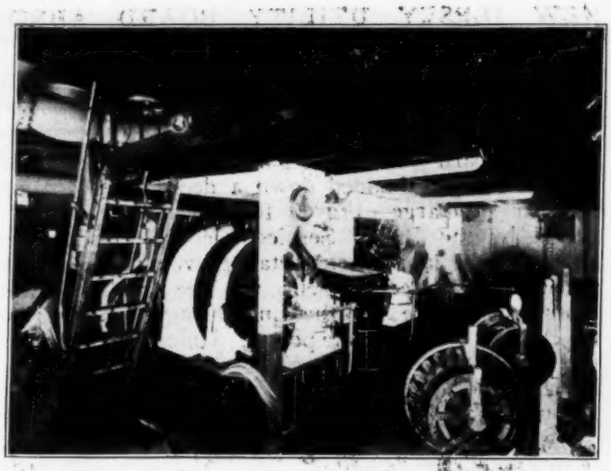
One of the Two Main Turbogenerators for Producing the Polyphase Current for the Propeller Motors.



One of Six Turbogenerator Sets for Supplying Lights, Fans, Cranes, Wireless, and Scores of Auxiliary Motors.



Main Switchboard and Control Apparatus Through Which Current Passes to the Propeller Motors.



Two Main Exciter Sets for Turbogenerators that Supply Current to the Propeller Motors.

6 motors in laundry;
4 motors in print shop.

It is interesting to note that most of the electric lights of the *New Mexico* are dependent on two sources of supply, first, the auxiliary turbogenerators already mentioned and, second, a set of storage batteries which are designed to be brought into service if for any reason the main source should fail.

Two electrically driven boat cranes used in hoisting and lowering the boats and loading supplies aboard the ship have a capacity of 4000 lb. each. The large-calibre guns are fired by electricity; ammunition is hoisted from the magazines by electric motors and some of the big guns are loaded by electricity.

The ponderous rudder is moved into any desired position by the simple turn of a controller on the navigating bridge, which sets in motion machinery in the hold of the vessel for this purpose. There are several steering stations located in various parts of the ship where this operation may be performed in case one station should be disabled. In all, there are five different ways of steering the *New Mexico*, one of which is the hand method, which requires the exertions of six men.

There is a complete equipment of motor-driven machines in the carpenter shop, machine shop, foundry, laundry, bakery and kitchen. In the bakery bread is baked in electrically heated ovens; in the laundry five electric dryers are used, and in the hospital quarters are several electrically heated sterilizers.

Space does not permit detailing all of the marvelous electrical devices of this ship, but among these are the following:

22 radiotelegraph sets;
12 searchlights;
2 Sperry master gyroscope compasses with numerous repeater compasses;
104 loud-speaking telephones;
176 ship service telephones;
170 fire-control telephones;
50 electric air heaters or radiators for warming exposed positions that cannot be economically heated by steam;
6 electric toasters;
15 electric flatirons;
6 electric soldering irons;
2 electric glue pots.

Other interesting facts about this powerful vessel are the following:

The *New Mexico* was built at the Brooklyn Navy Yard and launched in the summer of 1917.

She is 624 ft. over-all.

She has a 97 ft. 4½ in. beam.

She displaces 32,000 tons.

She draws 30 ft. of water.

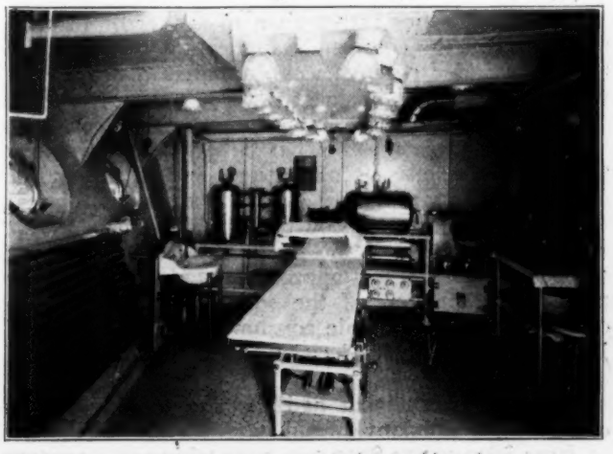
At full speed she can make slightly in excess of 21 knots.

She can generate 28,000 hp. for propulsion.

Her crew numbers nearly 1200 men.

She burns oil instead of coal as fuel and has a total fuel capacity of 3400 tons, or about one million gallons.

View in Laundry, Showing Motor-Driven Washing Machines, Electric Dryer and Electric Sterilizer.

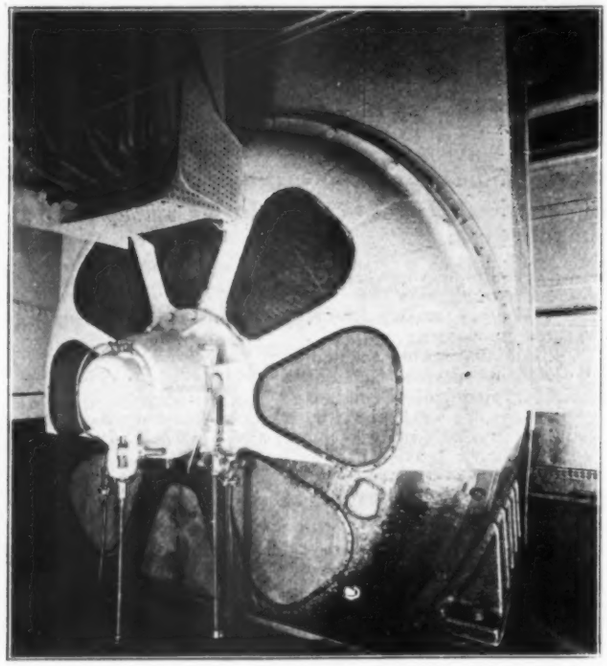


Operating Room in Hospital Quarters, Showing Electric Heating Apparatus and Special Lighting for Operating Table.

## NEW JERSEY UTILITY BOARD ABROGATES ELECTRIC SURCHARGE.

**War Surcharge of 25% Removed from Power Consumers, Except Wholesale Customers.**

The Board of Public Utility Commissioners of New Jersey has handed down a decision abrogating the war surcharge of 25% for electric service furnished by the Public Service Electric Co. to customers under a uniform retail power rate and the elevator rate, effective Sept. 1. The surcharge will continue in force for the time being as applies to the charges for wholesale power. Unless the company



Forward End of One of the Four 7000-hp. Propeller Motors of Battleship New Mexico. Diameter of Motor is 12 ft.

accepts this modification of the surcharge order, the entire surcharge will be set aside pending further decision of the Board.

Following investigations, the Board finds that the war surcharge, excepting in the case of wholesale power, has produced a revenue in excess of that expected when the application was granted, and due largely to the great increase in business resulting from war activities rather than to any error in computation. In the company's application for increased rates, the added revenue was estimated at $1,800,000, whereas the actual business done was far in excess. In the case of wholesale power, the Commission finds that the rates are somewhat proportionately lower than for other classes of service, and less than the charges existing in other eastern metropolitan areas for the same classes of consumers.

The abrogating of the surcharge will affect about 10,000 consumers, or approximately 95% of the power-using patrons of the company, the other 5% comprising the wholesale consumers of the company. In connection with its decision in this case, the Board says:

"It is apparent that had the surcharge not been allowed, the company would have sustained a deficit of from $800,000 to $900,000, even taking into account the unanticipated increase in the business. The result to the company for the year 1918, over and above the amount needed to maintain its usual dividend rate and to lay aside for depreciation an amount deemed necessary, was a net gain of $594,000.

"It is generally recognized that the extent to which the industries, particularly those engaged in war work, will continue at the speed of operation under which they were maintained during the last year is problematical. How far this will affect the use of power is doubtful. It thus becomes a matter for the Board to determine a sound public policy rather than a determination of the accuracy of financial estimates in making modifications of existing rates. The prices for labor and supplies are still uncertain and will probably remain so for some time to come.

"In a period of readjustment, public policy requires that the greatest care be exercised: First, that the utility be not made the victim of too optimistic a forecast and its revenues so curtailed that, in the event of unforeseen conditions, it shall be so crippled as to preclude the performance of its proper functions; second, on the other hand, in a period of readjustment, the public should be protected against prohibitive war rates, particularly where it is disclosed that, from the results of operation thereunder, an excess amount has been earned by the utility.

"From the Board's analysis, based upon the results of operation under the rates now in effect, and consideration of the estimates of the company, due regard being had to possible contingencies during the period of readjustment, both as to cost of labor and materials as well as to the extent to which industries in the territory served by the company will continue operations, the Board is of the opinion that a readjustment of the rates should be made at this time. The surcharge heretofore allowed cannot be removed entirely, as to do so would result in an actual deficit of several hundred thousand dollars, dependent upon the readjustments now taking place in the industries.

"The Board is of the opinion that the removal of the surcharge entirely from the bills charged to the customers under the uniform retail power rate and the rate for elevator service, and the continuance thereof on the rates of the wholesale power customers, refrigerator rate and kilowatt-hour rate will result in a sufficient net revenue to the company to assure the continuation of safe, adequate and proper service to the public, and to enable it to properly market its securities and thereby finance the necessary extensions required by the growth of the business."

## ANOTHER STRETCH OF ST. PAUL ELECTRIFICATION COMPLETED.

**Harlowton-Seattle Line, Electrification, 885 Miles Long, to Be Completed Jan. 1.**

President Calkins of the Chicago, Milwaukee & St. Paul Railroad recently announced that electric current would be turned on over another 110 miles of main line from Othello to Cle Elum, Wash., including a crossing of the Columbia river, in a very short time. By Jan. 1 the remaining 135-mile stretch of the road from Harlowton, Mont., to Seattle, will be completely electrified, 885 miles in all, or within 200 miles of half the entire length of the St. Paul-Seattle line.

The last stretch from Cle Elum to Seattle, 130 miles, will cost about $9,000,000, or 25% to 40% more, relatively, than preceding units, on account of higher prices of labor and material.

# Editorial Comment

## Stimulating Production by Up-to-Date Industrial Lighting

RAPIDLY shortening days again arouse general interest in lighting. This is the psychological time to put lighting campaigns into effect because now is commonly considered to be the most opportune time to rehabilitate lighting systems in offices, stores, factories and homes in readiness for long hours of usefulness during the autumn and winter. Lighting interests must decide on what lines of activity to give special emphasis without neglecting any. While this question will be decided differently in different localities, we believe that the nation as a whole will be most benefited by special attention to factory lighting in all industrial communities.

In an article in this issue is pointed out the peculiar timeliness of taking advantage of the stimulating effect on production resulting from improved industrial lighting. Of the various measures for combating the high cost of living, the most widely accepted and probably the most effective is increase of production. Much needed as it is, it has been retarded by the many economic and social uncertainties since signing of the armistice, but prospects of ratification of the peace treaties and truce in the relations of labor and capital, together with recognition of the unlikelihood that prices will fall very rapidly, should remove the principal uncertainties and permit replenishing of the world's supply of all useful commodities. Lighting is only one means of increasing production, but a potent one, as shown in the article. It is an essential factor in all production and when applied with intelligence has a marked stimulating effect upon production.

Aside from the stimulating effect of an up-to-date lighting system, there are special reasons why improvement in industrial lighting should be strongly advocated now. There are very many old plants that have reached the limit of their capacity as now arranged because large sections of the floor space cannot be effectively used due to the meagerness of their lighting. Provision of suitable lighting makes these areas useful and saves additional construction.

Moreover, an up-to-date lighting system makes it possible to operate with two or even three shifts per day, thus increasing the output two or three times at practically no investment expense. This possibility is especially valuable where real estate values, and therefore rents, are high and where there is a heavy investment in plant machinery and equipment. We believe there will be an undoubted tendency to utilize plant investment more intensively when manufacturers come to realize that multiple-shift operation is entirely practical with a good lighting system, and that it decreases the fixed charges per unit of output and offsets the higher wages and shorter hours that are now the order of the day.

## Association of Iron and Steel Electrical Engineers

OF THE industries employing electricity, the steel industry is the largest single industrial consumer. Year by year the kilowatt-hours consumed in the steel industry have increased as the tonnage increased and as electric power supplanted hydraulic, steam and pneumatic power in divers ways. And then the electric furnace, that has made such healthy headway in steel mill and foundry, is also responsible for its quota of energy consumption, a form of load that will increase, the more so as preheating, annealing and tempering come to be carried out electrically.

The problems of electrification in the steel industry, while being basically similar to electrification in any other industry, have many peculiarities of their own. The applications of electric power are many, giving rise to an urgent demand for standardization. Reliability is paramount, because cessation of some one detail in the production of steel may cripple the day's output and ruin large masses of metal. Low cost is fundamental, which means efficiency of application of electricity. Having many problems of its own, and in view of the fact that electricity enters in so many different ways it is but natural that electrical engineers concerned with the application of electricity in the steel industry should tend to come more and more closely together and share their experiences for mutual gain. To do this is the function of the Association of Iron and Steel Electrical Engineers.

This young and growing association will hold its thirteenth annual convention in St. Louis the latter part of September, and the tentative program of papers indicates that the convention will be a very interesting one for the electrical industry in general. In addition to the various reports on such foremost matters as standardization, safety, education and electric furnaces, a series of joint papers on "Organization of the Electrical Department in the Steel Industry" should be found instructive to many other industries where electric drive is a prime factor in production. Electric welding will come in for its quota of discussion in seven papers by representative manufacturers. "Meter Equipments in Steel Mills," "High Temperature Furnaces," "Recent Improve-

ments in Industrial Control," and a general discussion on the design and operation of electric cranes and lifting magnets are other topics that are to come up at the meeting.

The steel industry is an industry unto itself. And yet all of us are vitally concerned in its progress in some way or another; and the more we know about it and its problems the better it is for us and for the steel industry. Meanwhile the engineers in the iron and steel industry are tackling their problems with a vim deserving of success. To what extent they are responsible for the rapid development of electrical apparatus and its evolution in the steel industry we do not know. But that much credit is theirs must surely be a conservative statement and stinted praise.

## *Making Utility Strikes Oboslete*

WE HAVE on numerous occasions pointed out the serious inconvenience and sometimes danger to the public of the recently frequent strikes of street-railway, telephone, railroad and other public utility employes, and we have advocated that such strikes be prohibited without curtailing the rights of the employes to have their desires heard and fairly considered. At a recent hearing before a Congressional committee Mr. Charles Piez, well known as a manufacturer and for his recent connection with the United States Shipping Board, laid special emphasis on the question of doing away with railroad strikes. Mr. Piez advocated the creation of a board of arbitration by the Interstate Commerce Commission to deal with all labor disputes, and he would give the public representation on that board. With the formation of this agency to investigate and give disinterested decisions, railroad workers would be required to waive the privilege of striking and the railroad managers would have to exercise similar self-restraint in the matter of lockouts.

In a bill dealing with the railroad question that was introduced in the United States Senate this week somewhat similar provisions are included. In an editorial, the *Chicago Daily News* says: "The soundness of the basic idea—that railroad strikes and lockouts should be prevented by law, which at the same time should effectively protect railroad workers from every form of injustice by careful scrutiny and timely revision of the wage scales and other conditions of service—is not open to serious question. Much confused thinking has been done on the subject and many wild assertions have been made in defense of the strike, but the fact remains that the public's interests are paramount, provided the public takes ample precautions to prevent injustice to those who serve it faithfully."

All these are good indications of rational consideration and solution of the subject and we hope that this provision of the railroad bill will be enacted and that similar measures will be passed with respect to other public utility employes.

## *Electric Cooking and A Large Utility*

COOKING by wire is coming apace. In many instances electric cooking is gaining although the central station concerned does not energetically encourage it. In some instances the utility interested in supplying electric light and power also supplies gas, and effort is made to encourage cooking by gas. In other instances a low rate by a competing gas company is looked upon by the utility as a powerful deterrent and one the electric utility does not feel justified in seriously competing with when it comes to developing the electric cooking load. The fact that there may be a tendency for the cooking load peak to overlap with the evening winter peak is also an influencing factor no doubt. But there are many more utilities that have realized the possibilities of electric cooking load and are going after it seriously with good results.

The frank statements as to the policy of the Detroit Edison Co. toward electric cooking, as outlined in an article by Mr. R. F. Hotton appearing elsewhere in this issue, are of exceptional interest. In brief, one judges from Mr. Hotton's article, that the Detroit Edison Co. has allowed the electric cooking load to come to it in the city, but has not gone after it. In the rural communities this type of load has been encouraged.

In the largest cities, like New York, Chicago and a few more, it is true that the cooking load occurs during the time when the daily winter peak occurs, since cooking, lighting and power exist simultaneously. However, while in the largest cities it is a fact that the heaviest meal of the day occurs at night, it is also a fact that in the smaller cities, of 200,000 population and below, the heaviest meal occurs at noon. The reason for this is, of course, that in the largest cities, there is an exodus at evening to the suburbs where the family reunion is held over the dinner table, whereas in the smaller cities, people are able to go home to midday lunch.

The possibilities of the farmer and rural communities as markets for the electric range—and all electrical appliances—are probably not yet realized. What the Detroit Edison Co. has done, and it has probably as yet merely scraped the surface, can be done elsewhere. One fact brought out in Mr. Hotton's paper is that when one electric range is installed, it is particularly desirable to obtain similar installations in close proximity. It means more efficient utilization of investment, with an equitable gain to the consumer.

The importance of voltage regulation deserves special mention. Voltage drop interferes with the performance of the electric range—of any electrical appurtenance so far as that goes—lengthening the time required to cook, tending to injure the culinary achievement and sometimes jeopardizing the flavor of the product cooked. Even more serious is the effect of poor voltage regulation upon revenue, a fact that has been realized, but not perhaps appreciated to the full.

# Current Events

## *Pennsylvania Meeting Opens—New England Section's Convention Program—Export Record—N.E.L.A. Activities*

### PENNSYLVANIA ELECTRIC CONVENTION OPENS AUSPICIOUSLY.

**Large Attendance and Attractive Program Marks Opening of Twelfth Annual Convention of Pennsylvania Electric Association.**

With delightful weather and an initial registration of 211, the twelfth annual convention of the Pennsylvania Electric Association opened at Bedford Springs, Pa., on Wednesday evening, Sept. 3, with a brilliant reception to the president of the association, Thomas Sproule, of Philadelphia, and Mrs. Sproule. It was followed by dancing. Every indication points to the convention being the largest in the history of the association. Large numbers of members and guests were expected to come on Thursday morning when the first business session was to open. An attractive exhibition is being made by a considerable number of manufacturers, the displays being arranged in a large tent adjacent to the hotel. A fine collection of prizes has been donated by various manufacturers and jobbers for the card games, golf, swimming and other contests on the entertainment program. Telegraphic advices at the time of going to press seem to bear out a close following of the technical program that was published in our last issue, but Gov. William C. Sproul of Pennsylvania will be present on Friday instead of Thursday. A report of the meeting will be given in our next issue.

### NEW ENGLAND SECTION N. E. L. A. TO CONVENE.

**Outline of Important Topics to Be Discussed at Annual Convention to Be Held at New London, Conn.**

The eleventh annual convention of the New England Section of the National Electric Light Association will be held at the Hotel Griswold, New London, Conn., Sept. 22, 23 and 24. Plans have been made for seven interesting and helpful sessions, and it is expected that a large number will be in attendance. The afternoon session on Monday, Sept. 22, will be in charge of and assisted by members under forty years of age. F. A. Belden, Portsmouth, N. H., will be chairman of the meeting, assisted by Leavitt L. Edgar, of Boston. On Wednesday forenoon there will be an informal meeting for the discussion of subjects of general interest to accountants. The convention program may be summarized as follows:

*Monday, Morning Session.*—Address of the president George B. Leland, Stamford, Conn.; report of the treasurer, Bowen Tufts, Boston; report of the secretary, Miss O. A. Bursiel, Boston; reports of standing committees as follows: Advertising and Publicity, L. D. Gibbs, Boston, chairman; Accident Prevention, H. W. Moses, Boston, chairman; and Membership, Merle R. Griffeth, Boston, chairman. A paper will be presented by Perry Barker, fuel engineer, Boston, on "The Purchase of Coal." Also a paper entitled "High-Power Switching Apparatus Used in Connection with Large Systems," by Fred L. Hunt, Greenfield, Mass.

*Monday, Afternoon Session.*—The presentation of the following papers will be the feature of the afternoon session: "Courtesy and Goodwill," by Leavitt L. Edgar, Boston; "What a Manager Should Find in His Monthly Report," by H. A. Gidney, Boston; "Meter and Engineering Department Systems from the Standpoint of Service," by Frank W. Randall, Portsmouth, N. H. "The Cost of Serving the Small Lighting Customer," by Bowen Tufts, Boston; a talk on thrift and saving by Major William A. Atkinson, War Loan Organization, Boston, will be given.

*Tuesday, Morning Session.*—Report of Commercial Section Committee, of which C. E. Greenwood, of Boston, is chairman, will be presented.

*Tuesday, Afternoon Session.*—The commercial session will be continued in the afternoon and the following papers given: "Co-operative Features of a Central-Station Accounting Organization," by H. M. Edwards, New York City; "The Use of the Electric Range in a Small City," by E. F. Putnam, Greenwich, Conn., and "Electric Ranges and Water Heating," by M. C. Osborn, New Britain, Conn.

*Tuesday, Evening Session.*—The dinner will be held at 7 o'clock and will be followed by the Public Policy Session. Addresses will be made by R. H. Ballard, president of the National Electric Light Association, Los Angeles, Cal.; and F. G. R. Gordon, Boston, on "Municipal Ownership and Socialism."

*Wednesday, Morning Session.*—Following the presentation of papers by Wallace S. Clark, Schenectady, N. Y., on "High Tension Cables," and Nicholas Stahl, Providence, R. I., on "The Control and Improvement of Power Factor," discussions of these subjects by operating men will be engaged in. This will be ensued by a paper entitled "Planning for Power as Applied to New England," by Prof. Charles F. Scott, Sheffield Scientific School, New Haven, Conn.

*Wednesday, Afternoon Session.*—Reports of the following committees will be presented: Accounting Section Committee, Frederick E. Webster, Haverhill, Mass., chairman; Electric Vehicle Committee, Day Baker, Boston, chairman, and Heating Research Committee, G. F. Parsons, Boston, chairman. This part of the program will be succeeded by the annual meeting of Class A members and the election of officers.

A number of entertainment features have been provided for the convention, one of which is the dancing party on Monday evening in charge of Lieut.-Col. H. A. Gidney. This will immediately follow the reception and will be held in the ballroom of the Hotel Griswold. Attractive sports in the way of golf and tennis at the Country Club, adjoining the hotel, are offered to convention delegates, and prize contests in golf, as well as a tennis tournament, will be held during the three days of the convention.

## NEW AND EXTRAORDINARY RECORDS IN ELECTRICAL EXPORTS.

**Figures for June Over Double Those of a Year Ago—Fiscal Year Nearly 48% Better Than Last.**

Astounding figures on the growth of our electrical export trade are disclosed in the monthly summary of the foreign commerce of the United States for last June, just issued by the Bureau of Foreign and Domestic Commerce, Washington, D. C. Electrical shipments for that month totaled over 100% above those of the corresponding month last year, and nearly 40% over the preceding monthly record established last March. The figures for June also complete the data for the fiscal year ended June 30, for which the extraordinary sum of over $80,700,000 was reported, this being nearly 48% over the preceding fiscal year and more than 34% above the highest twelve-month—the calendar year 1918, whose total was $59,982,526. All these figures would be still higher if they included electric locomotives; the latter are separately listed in the government reports; during the fiscal year these were shipped to the value of $327,947.

In the following table are given the comparative figures for last June, for June of 1918, and for the fiscal years ended June 30, 1919, and June 30, 1918:

| | June | | Fiscal year | |
|---|---|---|---|---|
| Articles. | 1919. | 1918. | 1919. | 1918. |
| Batteries | $ 787,748 | $ 272,316 | $ 4,800,668 | $ 3,351,838 |
| Carbons | 173,582 | 117,995 | 1,672,106 | 1,525,128 |
| Dynamos or generators | 760,546 | 133,549 | 4,269,103 | 2,688,169 |
| Fans | 130,817 | 164,486 | 1,297,017 | 818,338 |
| Heating and cooking apparatus | 192,551 | 49,185 | 1,222,886 | 533,988 |
| Insulated wire and cables | 1,420,699 | 340,138 | 8,683,304 | 5,730,766 |
| Interior wiring supplies, including fixtures | 280,631 | 138,805 | 1,926,177 | 1,532,309 |
| Lamps— | | | | |
| Arc | 173 | 90 | 14,555 | 13,308 |
| Carbon-filament | 5,276 | 3,985 | 166,294 | 144,761 |
| Metal-filament | 530,085 | 475,768 | 4,465,075 | 3,182,516 |
| Magnetos, spark plugs, etc. | 219,826 | 167,710 | 3,020,610 | 3,167,326 |
| Meters and measuring instruments | 319,336 | 208,294 | 2,618,405 | 1,592,195 |
| Motors | 1,562,521 | 521,442 | 10,677,354 | 6,598,664 |
| Rheostats and controllers | 65,384 | 24,170 | 434,413 | 212,059 |
| Switches and accessories | 593,975 | 188,408 | 2,663,327 | 2,229,023 |
| Telegraph apparatus, including wireless | 92,220 | 11,659 | 765,011 | 294,297 |
| Telephones | 377,395 | 274,809 | 3,135,851 | 2,566,929 |
| Transformers | 438,483 | 464,195 | 4,423,007 | 2,343,968 |
| All other | 3,039,569 | 1,462,515 | 24,457,147 | 16,021,380 |
| Total | $10,990,717 | $5,019,519 | $80,712,310 | $54,546,961 |

In the following table are given the monthly totals of electrical shipments from the United States during the 12 months of the fiscal year ended June 30, 1919. This table shows that November, January, February, March and June in turn broke all preceding monthly records. These monthly figures also show that the extraordinary total for the fiscal year is due chiefly to the decided impetus to the foreign electrical trade since the signing of the armistice on Nov. 11, 1918.

| Month. | Electrical exports. | Month. | Electrical exports. |
|---|---|---|---|
| July, 1918 | $5,393,949 | January, 1919 | $6,722,524 |
| August, 1918 | 5,340,110 | February, 1919 | 7,566,089 |
| September, 1918 | 5,146,077 | March, 1919 | 7,876,353 |
| October, 1918 | 4,860,392 | April, 1919 | 7,709,138 |
| November, 1918 | 6,177,252 | May, 1919 | 7,717,518 |
| December, 1918 | 5,187,981 | June, 1919 | 10,990,717 |

The following table gives the totals for the last seven fiscal years.

| Fiscal year. | Electrical exports. | Fiscal year. | Electrical exports. |
|---|---|---|---|
| 1912-13 | $26,772,816 | 1916-17 | $51,903,823 |
| 1913-14 | 25,060,844 | 1917-18 | 54,546,961 |
| 1914-15 | 19,771,757 | 1918-19 | 80,712,310 |
| 1915-16 | 30,254,020 | | |

This last table shows the effect of the world-wide depression just before breaking out of the World War, followed by the worse depression during its first year up to about the beginning of 1916 when both neutrals and belligerents began turning to the United States for their electrical supplies, since which time there has been steady growth of our foreign electrical shipment, especially since active fighting ceased last November.

## CONCLUDING SESSIONS OF MICHIGAN SECTION N. E. L. A. TACKLE COMMERCIAL PROBLEMS.

**Commercial Papers and Election of Officers Concludes Successful Meet.**

The concluding session of the convention of the Michigan Section of the N. E. L. A., held Thursday morning, Aug. 28, was devoted to matters pertaining to electrical merchandising, electric ranges and cooking and fire insurance.

Three papers were presented, namely, "Electrical Merchandising" by A. H. Touscany, Detroit Edison Co.; "Electrical Ranges" by R. F. Hotton, Detroit Edison Co., and "Notes on Fire Insurance," by J. H. Lobben. In the absence of Mr. Lobben, his paper was read by S. L. Ferguson.

On the first two papers presented there was a general discussion, the main points being brought out on the paper dealing with electric ranges.

Mr. Johnson of the Consumers Power Co. opened this discussion in which he recommended making tests for the diversity factor; in this way an idea of the relation between the lighting load and that of the ranges can be readily obtained.

Mr. Cavanaugh of Benton Harbor spoke briefly as to his experience with electric ranges, covering 10 years experience. He pointed out that there was a big diversity factor in the electric range load so that the connected load could be far in excess of the transformer capacity serving electric range customers.

Following the open meeting of the morning, there was an executive session at which the following officers and Executive Committee were elected. The meeting then adjourned until the annual meeting next year.

W. M. Lewis, Muskegon, president.

Geo. E. Lewis, Ann Arbor, first vice-president.

John Swanson, Jackson, second vice-president.

Herbert Silvester, Ann Arbor, secretary-treasurer.

Executive Committee: Thos. Chandler, Sault Ste Marie; H. A. Fee, Adrian; John A. Cavanaugh, Benton Harbor; R. E. Keller, Kalamazoo; Earle L. Milliken, Houghton.

## TWO NEW N. E. L. A. COMMITTEE CHAIRMEN ANNOUNCED.

**J. F. Gilchrist and F. T. Griffith to Head Water-Power Development and Public Information Committees.**

President R. H. Ballard, of the National Electric Light Association, announces the acceptance of John F. Gilchrist, vice-president of the Commonwealth Edison Co., of Chicago, Ill., as chairman of the Committee on Public Information, and also of Franklin T. Griffith, president of the Portland Railway, Light & Power Co., of Portland, Ore., as chairman of the Committee on Water Power Development. These important committees will have valuable and instruc-

tive reports to submit to the National convention of 1920, which will be held in Southern California.

The Committee on Public Information is a new committee and Mr. Gilchrist will organize it by establishing in each state or geographical section a local committee which will finance itself and furnish news bulletins to the press through member companies. Recommendations for appointment as members of the general committee, of men selected as chairmen of committees in various states, will be made by Mr. Gilchrist and will be submitted for approval to the president and to be acted upon by the Executive Committee.

This will be a very large committee but as its work will be largely devoted to states and geographical sections, it is unlikely that its entire membership will ever be called to meet. Thus its proportions will not be objectionable. Mr. Gilchrist was instrumental in starting a movement along these lines in Illinois which proved very successful. It is believed that to extend it to every state in which company members may desire assistance, will accelerate its effectiveness.

The work of the Committee on Water Power Development, which will be under the direction of Mr. Griffith and with which he will associate with himself prominent executives from all of the Pacific Coast companies and also some of the executives from eastern companies, has before it an enormous scope for its activities. The purpose of its organization is to investigate and encourage water-power development and it is the first general committee of the association to take up this most important feature of the electrical industry.

Both the Department of the Interior and the War Industry Board and other bodies have collected an enormous amount of data in relation to the problems of water-power development. Mr. Griffith's committee will not only collect and codify the information gathered by these bodies, putting it into workable shape for the use of geographical and central states, but will pursue when there seems to be necessity a line of original investigation. The necessity for conservation of the natural resources of the Nation, the impending shortage of both coal and fuel and the probability of large increases in the demand for electric energy by partial railroad electrification, make the work of this committee of paramount importance and its report will be of the greatest assistance in the large financing which extensive water development will involve.

## EXECUTIVE COMMITTEE OF COMMERCIAL SECTION, N. E. L. A., HOLDS MEETING.

### Plans for Work During Ensuing Year Presented and Approved at Recent Meeting.

The Executive Committee of the Commercial Section, National Electric Light Association, held a meeting recently at Association Island, N. Y. At this meeting the plans for the section work during the coming year were presented and discussed. John G. Learned, chairman of the section, presided at the meeting. The following officers and members were also in attendance: M. S. Seelman, Vice-Chairman; R. H. Tillman, Secretary; M. O. Dellplain, E. A. Edkins, F. H. Gale, L. D. Gibbs, R. S. Hale, O. R. Hogue, S. M. Kennedy, F. A. Ketcham, R. H. Knowlton, L. H. Lamont, C. L. Law, I. Lundgaard, F. D. Pembleton, A. A. Pope, Charles J. Russell and A. Jackson Marshall, Executive Representative; and by invitation Fred R. Jenkins, Walter Neumuller, C. K. Nichols and J. M. Wakeman.

At the first session Chairman Learned submitted a list of bureaus and committees, together with respective chairmen selected, as follows:

Bureaus.—Advertising and Publicity Service Bureau: L. D. Gibbs, Boston, chairman; Lighting Sales Bureau, Clarence L. Law, New York, chairman; Merchandise Sales Bureau, E. A. Edkins, Chicago, chairman; Power Sales Bureau, R. H. Knowlton, Philadelphia, chairman.

Committees.—Commercial Service and Relations with Customers Committee, R. F. Bonsall, Baltimore, chairman; Committee on Education, Fred R. Jenkins, Chicago, chairman; Committee on Relations with Contractors, Dealers and Jobbers, M. S. Seelman, Brooklyn, chairman; Committee on Compensation of Salesmen, Adolph Hertz, New York, chairman; Electrical Salesman's Handbook Committee, I. Lundgaard, Rochester, chairman; Finance Committee, M. S. Seelman, Brooklyn, chairman; Committee on the Sale of Company Securities to Customers and Resident Citizens, A. F. Hockenbeamer, San Francisco, chairman; Wiring Committee, R. S. Hale, Boston, chairman.

The appointment of A. Jackson Marshall as Executive Representative of the Commercial Section was confirmed.

In reporting for the Lighting Sales Bureau, Chairman Law presented a chart showing the organization of the bureau under which it is proposed to operate during the present year. The Executive Committee of the Lighting Sales Bureau will consist of representatives of the various geographic sections and company sections, appointed by the chairmen of these various sections; representative of the National Council of Lighting Fixture Manufacturers, a representative of National Association of Electrical Contractors and Dealers and the chairmen of the various divisions of the bureau. The chart also showed the channels through which the information collected by the various divisions of the bureau will be distributed. Through this organization it is proposed to keep closely in touch with all commercial subjects having reference to work of lighting sales.

The activities of the Lighting Sales Bureau will be substantially the same as in the past, with the addition, however, of activities necessary in co-operating with the various geographic sections, the company sections, and associations which will be affiliated with the bureau because of their relation to the general subject of lighting and its commercial aspects. Relative to the activities of the Lighting Sales Bureau at the 1920 convention, Mr. Law proposed to have a presentation of reports accompanied by demonstrations in all cases where possible. This is considered a good plan in view of the fact that it not only promotes interest in the report, but gives an opportunity to demonstrate practically the recommendations made by the committee.

In the discussion that followed it was the consensus of opinion that the organization plan evolved by Mr. Law would effectively connect the Commercial Section with the geographic sections, state organizations and company sections.

Consideration was then given to the matter of meetings of bureaus and committees and the Executive Committee of the Section during the administrative year.

Chairman R. H. Knowlton of the Power Sales Bureau made preliminary recommendations regarding

divisional organization as follows: General power, industrial electric heating, electro chemical, isolated plant, electric steel furnace, current rate practices, special addresses for convention, and geographic sections. The recommendations were approved.

Chairman Edkins of the Merchandise Sales Bureau reported that this bureau was to be organized along two lines, dealing with "Research" and "Service," indicating that in his judgment the most important work which the bureau could undertake would be a thorough investigation as to the best methods of organizing merchandising activities, including how to improve present methods and how to secure more business. A tentative divisional organization outline of the Merchandise Sales Bureau was presented as follows: Household electric ranges, electrically equipped furniture, electric shop merchandise, merchandising service to central stations, merchandising statistics and economics and standardization and national testing. Some or all of these divisions will be further subdivided into groups.

Mr. Edkins also spoke of the desirability of representation of this bureau on the Advertising and Publicity Service Bureau, the Lighting Sales Bureau and the Power Sales Bureau, and any committees whose work may in any way be related to the development and sale of electric shop merchandise.

Chairman L. D. Gibbs of the Advertising and Publicity Service Bureau suggested that the bureau's work this year should be considerably broadened to the end that advertising and publicity service could be rendered the electrical industry, and that it should be the function of the bureau to impart information pertaining to Commercial Section activities to all branches of the industry and obtain the co-operation of all concerned. Chairman Gibbs recommended that the bureau be organized with two divisions and four groups: First, a Publications Division which would have charge of all booklets, circulars, etc., and a General Advertising Division with four groups: (a) co-ordinate advertising and sales campaign work; (b) illuminating engineering, co-operating with the Illuminating Engineering Society, Lighting Sales Bureau and other related activities; (c) co-operation with manufacturers of nationally advertised commodities; (d) more service outlets. There will be included in the personnel of this bureau at least one member from each state and liberal cross-membership with bureaus and committees of the Commercial Section.

Chairman R. S. Hale of the Wiring Committee recommended that the committee be permitted to prepare a lecture treating with wiring methods for the benefit of the contractors, etc., and advised that a sub-committee had been appointed to prepare a table of contents on the subjects which such lecture should cover. He also advised that it seemed desirable to prepare a lecture on wiring methods for the benefit of the householder, and that a subcommittee had been appointed to suggest a synopsis for this. Mr. Hale reported as to tests which the committee is conducting in the matter of wiring, which it is calculated will continue for a number of years with a view to ascertaining the behavior of different kinds of wire when employed under different conditions in actual practice.

Chairman I. Lundgaard of the Electrical Salesman's Handbook Committee reported that the supply of handbooks was entirely exhausted, and it would therefore be necessary to consider the publication of a new edition. A very extended discussion ensued regarding the form (loose leaf or bound volume) which the handbook should assume. The consensus of opinion favored the development of small bound volumes covering grouped subjects.

Chairman Fred R. Jenkins of the Committee on Education of Salesmen advised that he would attempt to organize this committee further along the general lines employed by the Lighting Sales Bureau. He emphasized the importance of educational courses, particularly at this time when central-station companies are rehabilitating their forces, depleted on account of the war, and asked the earnest co-operation of central-station commercial managers in this work, which would be emphasized this fall by an advertising campaign calculated to cause increased enrollment. In connection with the report consideration was given to the idea advanced by Chairman Jenkins that the committee be authorized to make available educational courses to other than N. E. L. A. members, and after discussion, Chairman Learned was requested to take this up with the National Executive Committee.

Chairman M. S. Seelman of the Committee on Relations with Contractors, Dealers and Jobbers advised that as this committee had been decided upon but recently, there had not been sufficient time to suggest personnel and to define its scope of activities. Mr. Seelman pointed out the desirability of close co-operation with other branches of the electrical industry, and suggested that the personnel of the committee might be formed of representatives of the jobbers association, contractor-dealers association, manufacturers association and representatives of the N. E. L. A.

S. M. Kennedy urged that the Committee on the Sales of Company Securities to Customers and Resident Citizens be continued, pointing out the growing tendency, at least in certain sections of the country, to sell central-station securities to the public, and stated that if such practice were continued the commercial men of central-station organizations were by temperament, experience and ability best qualified to merchandise them. A. H. Hockenbeamer, Pacific Gas & Electric Co., who has had considerable experience in the sale of securities to the public was appointed chairman of this committee.

L. A. McArthur, general manager of the Pacific Light & Power Co., Portland, Ore., was elected to fill the vacancy on the Executive Committee caused by the resignation of W. H. Hodge.

## TRACTION LINES FORCED TO SHUT DOWN BECAUSE OF COST.

**Two Lines in New York City Fail to Meet Operating Expenses for Years and Will Cease Operations.**

The Public Service Commission for the First District, New York, has been informed that the Long Island Electric Railway Co., which operates as a trolley road from Jamaica to Far Rockaway, is ready to ask the courts, through a receivership, to discontinue operation, wind up its affairs and sell its rails and other property to the highest bidder. The company is owned jointly by the Interborough Rapid Transit Co. and by the Long Island Railroad Co., which have advanced numerous sums in recent years to provide its running expenses. The company has not paid interest on its bonds for many years and never has paid dividends on its stock. The parent company refused longer to advance moneys for maintenance and operation, and officials of the road declare they must shut down.

# Commercial Practice

## *Merchandising Electrical Appliances — Economic Side of Central-Station Advertising — Continuous Service Ruling*

### OPPORTUNITIES AND DEVELOPMENTS IN ELECTRICAL MERCHANDISING.

**Many Suggestions Contained in Paper Presented Before Sales Managers by Earnest A. Edkins.**

At the recent meeting of central-station sales managers, a very interesting paper entitled "Merchandising Electrical Appliances" was presented by Earnest A. Edkins, general manager of the Electric Shops of the Commonwealth Edison Co., Chicago. In this paper Mr. Edkins gave many valuable suggestions on merchandising and building up sales which are of special interest to central-station men but are equally applicable and effective for any electrical retailing establishment and pointed out some of the present and impending opportunities and developments in the electrical merchandising field.

The basic principles and general methods of merchandising which have been pretty well thrashed out and standardized in other lines of retailing are just as applicable to the sale of electrical appliances. As these principles and methods have proven very successful in these other lines and also because the general public is accustomed to them they should be carefully studied by electrical merchants and applied to their business if the best results are to be obtained.

One of the most essential obligations laid upon the public service company is to render the very best possible service and this applies to merchandising by these firms as well as their other service. Real service, however, means giving the customer what he wants and in electrical merchandising it includes the selling of all goods associated with electricity. For example, a flashlight does not add any load to the central-station company's lines, but it should nevertheless be handled by the central-station retail shop as a mark of service. For to the average customer it is electrical and if he can not secure it at the electric shop he will go elsewhere for it and when in need of other electrical goods will go to the second place also. Under the heading of kindred merchandise comes such accessories as trays, creamers, sugar bowls, vacuum bottles, chafing dish sets, silk for lamp shades, parchment, automobile accessories, small electrical devices, etc. Such stock also averages up very profitably and is a big factor in increasing attendance, while without it the appeal of the electric shop is sharply limited.

Three plans for stimulating merchandise sales were also described in the paper—premiums, coupons and deferred payments. All these plans have proved satisfactory in many other lines and are employed with great success by Mr. Edkins in the Electric Shops.

The premium plan is looked upon in some quarters with considerable disfavor. However, it is based upon human nature and appeals to a universal weakness—the desire to get something for nothing, and as long as human nature remains what it is it will be an effective means of increasing sales.

The coupon plan has been tested by Mr. Edkins in the Electric Shops for three years and he has found that it increases attendance, multiplies good will and builds up all classes of sales. The coupons used by the electric shops are purchased from the Federal Profit Sharing Co. and are given to customers, one for each five-cent purchase. They are redeemable at the rate of 1000 coupons for each dollar of retail price for all sorts of electrical merchandise. The Electric Shops are reimbursed by the coupon company for the value of the merchandise so redeemed. These coupons are also sold by the Electric Shops to other merchants for distribution among their trade. During the first six months of this year 73,753,750 such coupons have been put out in the city of Chicago. Each of these coupons is an advertisement for the Electric Shops and every customer who becomes a collector also becomes a booster.

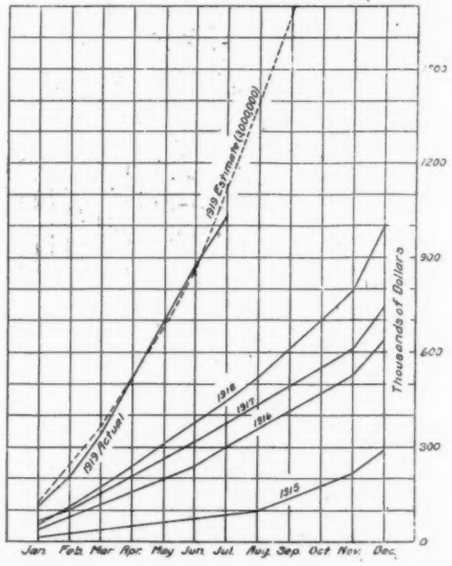



**Chart Showing Increases in Merchandise Sales of Electric Shops of Commonwealth Edison Co., Chicago.**

The tremendous value of the deferred-payment plan as a business builder is now recognized by the majority of central stations selling electrical merchandise. This plan is only another form of service and whether or not it is appreciated is perhaps best shown by the following figures. The success of this plan in other lines is shown by the following data compiled by the Chicago Association of Commerce covering a few of the articles sold in this city during 1918:

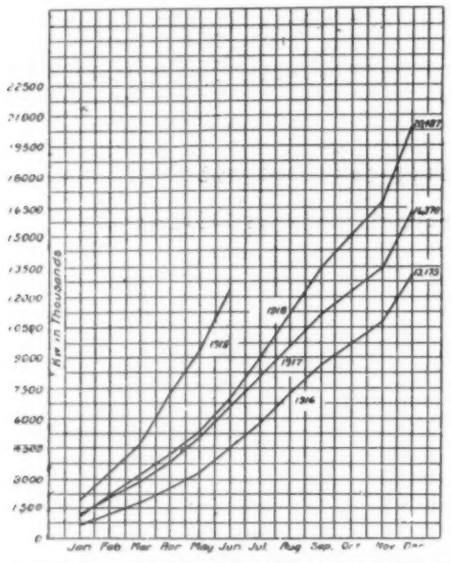
| | Percentage of total sales sold on deferred payments. |
|---|---|
| Pianos | 75% |
| Talking machines | 90% |
| Refrigerators (over $50 each) | 75% |
| Electric washers | 80% |

The following figures show the percentage in the Electric Shops on sales under different terms during the past five years during which the gross annual

sales (not including lamps) have increased from $250,000, to approximately $3,000,000:

| | Deferred payment. | Charge. | Cash. |
|---|---|---|---|
| 1915 | 35% | 40% | 25% |
| 1916 | 34% | 30% | 36% |
| 1917 | 37% | 27% | 36% |
| 1918 } 1919 } | 47% | 19% | 34% |

The specific opportunities for sales promotion offered by electric ironing machines, sewing machines, washers, suction sweepers, portable lamps and silk shades, seasonal sales, syndicating the sale of portable lamps and electric household conveniences were also fully described. Each of these appliances or methods offers a great field for activity which is especially favorable at the present time. The field for electric ironing machines, for example, has barely been touched yet it has been cultivated for many years by




**Total Load Represented by Electrical Merchandise Sold by Electric Shops.**

the sale of electric washing machines. The electric sewing machine is also especially desirable now for use in the small apartments in large cities.

The value of electrical appliances as load builders is now generally recognized. During the past few years when many central stations practically abandoned all efforts to secure new business that involved plant investment or line extensions this feature was especially desirable. The extent of the load thus secured by the Commonwealth Edison Co. through the appliance sales in its Electric Shops is shown by an accompanying chart.

It should also be remembered that the sale of appliances, backed up by painstaking service, constitutes one of the most valuable and effective means of creating good will toward the central station. So much comfort, convenience and labor-saving efficiency cannot be carried into the homes of its customers without inevitably causing them to feel kindly towards it in return.

The paper also called attention to the growing interest in and appreciation of the importance of style merchandise in electric shops. There is considerable room for improvement in the design of portable lamps, shades, electric appliances for table use, etc., but the manufacturers are now developing devices along this line and these developments should be watched with interest and be given practical support and encouragement.

Regarding the sales opportunities of electric ranges the paper included a number of figures showing the tremendous possibilities of this apparatus. In 100 towns now actively engaged in promoting ranges it was shown that only 0.22% of the population or 1% of the homes are now using electric ranges.

Another device that is just now beginning to appear on the market but offers a great opportunity for the electrical merchant is the electrically operated talking machine. The recent development of expensive cabinet types and period designs has made the projecting crank a very undesirable feature and the manufacturers are now squarely up against the necessity of producing electrically operated machines. When it is considered that about 4,500,000 of these machines are now produced every year the possibilities of this development for the electrical trade may readily be appreciated.

## THE ECONOMICS OF CENTRAL-STATION ADVERTISING.

**Abstract of Discussion Supplementing Paper by L. D. Gibbs at Recent Sales Managers' Convention.**

By R. S. Hale,

*Superintendent, Special Research Department, The Edison Electric Illuminating Co., Boston.*

One great difficulty in analyzing advertising is that many things which are really advertising are not charged to advertising accounts, and also that the advertising department often does work and performs services which would have to be done anyway. There is no distinct line between the advertising account and many of the other accounts on the books.

In advertising, however, we may make a general division into:

1. Advertising that is a service for carrying on the business.

2. Advertising that is a promotion for increasing the business.

Though no sharp line can be drawn, yet, in the first class can be clearly placed such things as railway time-tables, or the sign over the door that directs people where to enter. The difference is that some advertising, like the railway time-table, really reduces the cost to the purchaser, while other advertising, such as advertising in the magazines, helps reduce the cost only if it increases the seller's output enough to enable him finally to reduce his price. This distinction becomes clearer if it is remembered that the purchaser of goods includes in his real costs not only the money he pays the seller, but his other expenses in making the purchase, such as freight and delivery charges, and also his own time, or the time of his purchasing agent in making the purchase. Anything, like a catalog, that saves the time of the purchasing agent really reduces the total cost to the purchaser, and, therefore, warrants the purchaser in paying a higher price to the seller, a price usually enough higher to pay for publishing the catalog. The catalog is then service rather than promotion. But, on the other hand, a beautiful large catalog sent out broadcast would be promotion advertising rather than service advertising.

This distinction between service advertising and promotion advertising is an important one. There is also another line of distinction which is a little different, and also very important. It depends on looking at the problem not only from a different angle, but from an entirely different viewpoint, and then this view-

point brings out the reasons why advertising sometimes pays and sometimes does not pay.

The problem of advertising, as in all other problems, starts with some definite set of conditions, which may be described as the budget or plan for the next year and future years. Such a budget always exists in the mind of the executive, even if it is not put on paper.

When he considers the advertising problem, he considers what will be the effect if he spends, say, $10,000, for advertising in the daily newspapers. He figures that this will mean so many more kilowatt-hours sold, so much more coal, so much more labor, so much more expenditure for new service or plant, so much more interest or dividends on the new money, so much more income, and he finally decides what he had better do, as between the present budget based on no change in his orders, or the new budget based on a $10,000 expenditure.

He will also consider whether the particular advertising will stimulate existing customers or not, attract new ones, and so on. If on a central station each customer doubles the use, it is one thing. If on the other hand, the central station doubles the number of its customers, putting in no new lines, but only new services, it is another thing, while if a central station doubles by going into virgin territory, the case is still different.

It is true that ordinarily the increases in the business of a central station in different years are usually of much the same nature, and they usually involve a much greater increase in income than the increase in expenses. This is because a large portion of the increase in business comes on lines already built, and therefore, does not necessitate an extension. But this is not always true. An increase in business may involve a long line to reach a distant customer, or may just overload a turbine station and involve building a new station which will not be loaded for several years.

In the ordinary case the executive estimates that any increase in business will bring an increase in net profits, hence, he is willing to spend money in promotion advertising to get that business quicker. Even if he knows that the business will come anyway, say in five years, he may figure that spending one year's profits to get it all on his books in anything less than four years may show a profit.

On the other hand, in the case that is not ordinary, the reverse may happen. When it is a question of a long expensive line and a small increase in income, the net profits will probably be greater if the long line is postponed instead of hastened. In such cases advertising to increase the business would do harm. During the war, budgets without promotion advertising showed better results than the budgets that included promotion advertising, since the latter at that time involved a much greater investment than the expected increase in income.

The result of this analysis clearly points to the importance of directed advertising, that is, to the importance of advertising strenuously in some cases, and not advertising or promoting at all in other cases. As the matter is gone into further, the importance of directed advertising comes out even more clearly.

For example, in the electric business there is the off-peak business. We can usually afford to stimulate fan business, heating business and power business, since on the whole each kilowatt-hour thus used increases expenses less than kilowatt-hours used for lighting. Even if lower rates are made for this off-peak business, they are a form of promotion advertising, and the question is, will such advertising increase the net profits enough to warrant the expenditure? Off-peak rates might even be made so low that it would pay to stimulate peak business by advertising. Conditions differ in each case, but the problem always is:

What will happen if we go along without change?

What will happen if we make some change?

Finally, which is best of all the possibilities considered?

In central-station advertising a case might be made out for directing the advertising solely at customers adjacent to existing lines. This is seductive since a new customer who requires only a service is much more profitable than if an extension is required. If, however, the extension of lines goes along a street with many prospects, the general budget should include an allowance for the advertising power of the new line and customer. In my opinion 90% of the growth of the ordinary central station is the result of the talk of its existing customers. Therefore every customer, even if he is individually unprofitable, helps to get other profitable customers.

However, the fact that the new line may be worth while because of its effect in getting still more business does not lessen the importance of considering each case, and of directing the advertising. General advertising, it must be remembered, is also directed advertising in the sense that it is directed generally, and not at some particular feature. Obtaining the good will of the public, for example, is general advertising which is directed at the whole business. Such work is one job of the advertising department, though other departments should also obtain good will. The important point is the comparison of budgets and basing the final decision on a comparison that includes all the things that effect net profits.

Any advertising man who merely tries to increase the gross business of the company by advertising is neglectful of the company's interests and his own. He must consider the net results of each possible budget, campaign or plan. The advertising man should always be able to judge, approximately at least, the probable effect of his advertising on the gross business of the company; but that is not enough for the executive. He is concerned in the effect on the net profits. It is the probable final result that guides the executive in his decision as to which of several plans will be best. The executive will decide, but if the advertising man gets a clear idea of how his proposition will be judged, he will be able to present to the executive the propositions that will be the most attractive and most likely of acceptance.

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## MISSOURI COMMISSION RULES REGARDING CONTINUOUS SERVICE.

An interesting decision was made by the Public Service Commission of Missouri in the matter of the application of the Vandalia Electric Light Co., Vandalia, Mo., to discontinue service between 11 p. m. and 5 a. m. each day or increase its charges. The company had recently lost a large customer through the shutting down of the plant which prevented its rendering continuous service at a profit. The people of the town however were desirous of retaining such service but were of the opinion that the company should receive a fair rate for its services. The commission therefore ruled that the company should exact a surcharge of 10% on all bills except municipal accounts but that continuous service must be maintained.

# Operating Practice

## *Metering Hydroelectric Auxiliaries—Transmission Line Practices and Precautions — Steam Operating Problems*

### METERING OF AUXILIARIES AIDS ECONOMY OF HYDROELECTRIC PLANT.

**Conservation of Water Power Follows Regular or Periodic Use of Instruments.**

By Marcus A. Stillson.

When the war created an unprecedented demand for power and fuel, the hydroelectric plants of industrial concerns and public utilities were forced to take steps to utilize all available energy by reducing wastes and eliminating needless uses. And it is surprising what a large amount of water may be needlessly wasted through carelessness and lack of appreciation of its magnitude.

One instance where water is frequently allowed to be wasted is in driving the auxiliaries, exciters and pumps, etc. The most economical distribution of a given excitation and the auxiliary loads of any hydroelectric plant between motor drive and water-wheel drive is obtained only after output-discharge curves have been plotted and it is then known when the auxiliaries should be driven direct by water power or by motor obtaining its energy from the generators.

The auxiliaries of hydroelectric plants consume about 1% of the high-flow station output, excluding the power required for generator excitation. Notwithstanding this, it is usually possible to bring about a measurable economy of water power by a careful study of the load requirements of each individual piece of apparatus without financial expenditure. During times of extreme low flow stages the 1% mentioned above may easily become 2, 3 and even 4%, since certain of the station auxiliaries are required irrespective of the energy output of the station.

In many hydroelectric power houses no provision is made in the original installation to permit measuring the electrical input to motor-driven auxiliaries. This is a pity, because it is well to know just what are the power requirements of each motor-driven auxiliary and to what extent this demand varies from time to time with the station output. Such data enables economies to be made by modifying the mode of operating as already outlined. However, if permanent installations of watthour meters is not feasible, because of cost, it is usually quite feasible to furnish a means by which such instruments can be quickly inserted in circuit for periodic investigations. This proposal can be carried out quite inexpensively by installing small panels beside each motor-driven unit, upon which jumpers are mounted so as to permit connecting measuring instruments in circuit at any time without interrupting the flow of current to the motor. In this way the initial investment can be kept down with very little loss in flexibility.

It might be stated that the readiness with which operating engineers carry out tests to improve the water economy of their stations depends very largely upon the case with which the tests may be made.

### PRACTICES AND PRECAUTIONS IN WORKING ON LIVE TRANSMISSION LINES.

**Linework Experiences and Policies of Consumers Power Company.**

Several different methods are used by the Consumers Power Co. to test and change the insulators on their high-tension lines, the fundamental principle of them being that there is always a long insulating rod or other appliance between the man and the live part that is to be worked upon. In testing insulators on live lines advantage is taken of the fact that a difference of potential exists between the cap and pin of a disk insulator. A healthy, static spark is obtained if the insulator is good. If the insulator is poor, a weak spark or no spark at all results. The presence or absence of static on insulators can be readily determined and with proper tools an experienced man has no difficulty in picking out defective insulators. A line foreman standing on the ground 50 to 100 ft. from the pole or tower where the work is going on can clearly distinguish between a good and bad insulator by the noise made by the static spark.

The following is a brief description of one of the methods used to change defective insulators on high tension lines. The insulators are first tested and the defective ones are noted, a record being kept of the pole or tower and the position of the insulators. A crew, generally consisting of six men and the foreman, do the work of changing the insulators. Long insulating rods are first attached to the wire and the line is secured in position and held so it can not swing into the poles or towers. By means of rope blocks handled by men on the ground, the rods force the wire upward and outward from its regular position. This relieves the strain on the insulators and also holds the wire securely. The defective insulator is then removed and replaced with a good one. With proper tools it is not necessary for any of the workers to approach or place their hands or any part of their body within dangerous proximity of any live conductor.

#### Special Precautions to be Observed in Case of Line Trouble.

Noise and static on telephone lines, discharging lighting arresters or an unusual amount of static on or around lines and insulators indicates trouble and it may be due to defective insulators or to an "arcing ground," on the high-tension lines. Foremen should instruct their men to work with extreme caution at such times. It is generally advisable to stop the regular work of changing insulators until the cause of the trouble has been located. This precaution should always be heeded on system with a grounded neutral.

Before any work on high tension transmission lines is undertaken for the first time, a careful analysis is

always made of the job. Each operation should be considered and men should be selected and trained for the different operations they have to perform.

It is interesting to note that linemen who have tried both methods of changing insulators would rather work on live lines with insulating rods between them and the line, than on "dead" lines without this protection. The dangers incident to the accidental energizing of lines that are supposed to be "dead" are eliminated. Emergency or rush work which always adds to hazard is to an extent avoided and the work can generally be done in the day time when the light is good.

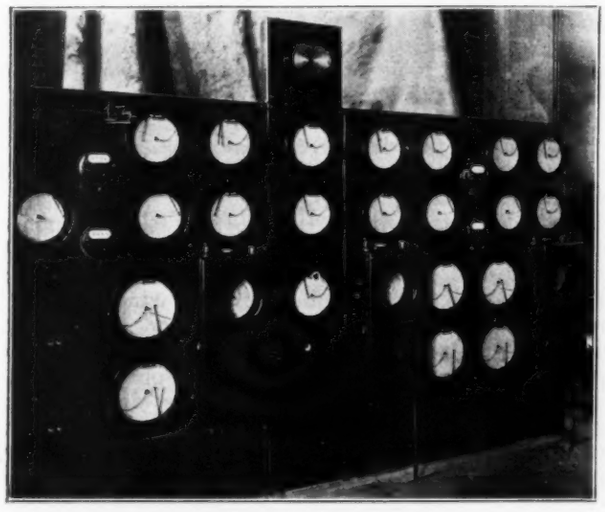
Telephone, telegraph, signal and other lines that parallel high-tension lines are always liable to be more or less energized and dangerous to handle. This fact should not be overlooked in instructions given to linemen.

The above is abstracted from a paper by H. J. Burton, before the Michigan Section of the N. E. L. A. In summing up Mr. Burton said: "The prime requisites for safe working on high-tension lines are: safe construction, a good foreman, competent workmen, equipped with proper tools and insulating appliances."

## DETECTING THE PRIMING OF BOILERS.

**Thermometers and Leaks in Pipes May Be Used as Tell-tales.**

The priming of boilers is often most troublesome and frequently very persistent. As a matter of fact, it often happens that boilers are priming without the knowledge of the firemen or water tenders or whoever it may be that should be conversant with the situation. Evidence of priming may be entirely lacking



**Board Containing Full Equipment of Instruments by Which Priming Could be Detected.**

in the glass, and the attendants may make the assertion that the boilers are not priming while they actually are doing so.

The real test lies in the quality of the steam leaving a boiler, of course. That means the temperature of the steam leaving the superheater, and this fact may be utilized as a check on a boiler that is suspected of priming, by the very simple expedient of installing a recording thermometer on the steam outlet from the superheater. Priming will be indicated, obviously, by sharp fluctuations in the superheat temperature curve and thus bring to light priming that might otherwise occur and persist without knowledge. The accompanying illustration is that of boiler-room instruments installed in the power house of the Oshkosh Gas Light Co. Fixture recording thermometers are installed in a convenient location so as to indicate priming.

Superheated steam is invisible whereas wet steam is visible, and this fact may also be utilized as a tale-tell of bad priming. A small leak in the steam line between superheater and the main steam header or line does not make itself visible so long as superheated steam escapes, but dirctly the boiler primes and wet steam passes through the leak, the leak becomes visible and indicates that priming of the boilers is occurring.

## SEALING OF TURBO LABYRINTHS IN 9400-KW. STATION.

By Mark Meredith.

In a steam plant there were one 4000-kw., two 2000-kw. and 750-kw. turbines, two of which have water-sealed pressure, and a comparison of these two methods of sealing, from an operating point of view, can therefore be readily made. The load curve for a 24-hour run of the small central station is a very erratic one, as there are continual small variations occurring in the load and also high peaks. This entails constant vigilance on the part of the turbine attendant, as the exhaust pressure on a turbine varies with each variation of the load, and the steam pressure on the high and low-pressure glands has to be adjusted accordingly. Any neglect or oversight on the part of the attendant in this matter, if the load drops considerably, results in a decrease in vacuum and a corresponding increase in steam consumption for the turbine. As this will probably occur a considerable number of times during a 24-hour run, it will be realized that it has a tendency to cause the steam consumption to be excessive.

The load connected to this station includes a 600-kw. electric furnace, which causes widely-varying and continual fluctuations in the load, and this aggravates the troubles, especially when it is run from one of the 2000-kw. turbines which has steam-sealed glands. The steam for sealing the glands on the 2000-kw. turbines has to be adjusted very closely as an even slight excessive amount of steam causes overheating of the thrusts bearings.

For the two turbogenerators having water-sealed glands the arrangement is as follows: A water storage tank is fixed to the engine room wall at a height considerably above the turbine level, and this is supplied from the city water supply. A ball valve is inserted in the tank to regulate the water level, and the water falls by gravity through pipes to the turbine glands. The water pressure on the glands is therefore a few pounds above atmospheric pressure, say 20 to 25 lb. per sq. in., hence it will be obvious that when a turbine is started up and water is put on the glands, no further adjustment is necessary, as the glands are continually sealed, irrespective of the variations in load and vacuum. This eliminates the reliance placed on the turbine attendant when steam pressure is used, and tends to reduce the steam consumption of the turbine, as the vacuum is maintained during the whole time the turbines are on load, unless condenser troubles occur.

# Contractor-Dealer

## *Getting After the Outlet Business—Value of National Publicity — Successful Advertising — One Jobber's Policies*

### FOLLOW-UP APPLIANCE SALES FOR OUTLET BUSINESS.

**Proper Service Requires Dealer to Assist Customer in Using Appliances.**

A great deal has been said recently about laxity of the electrical contractor who when he wires a home makes no attempt to sell the customer electrical appliances at the same time or to follow up the opportunity thus presented and sell the prospect at some future date. But how about the dealer who sells an electrical device without attempting to find out how the customer is going to use it. Isn't he also passing up a great opportunity? He surely is, and not only that, but he cannot consider that his service is even good unless he makes it convenient for his customer to use the device as well as to purchase it.

No reputable dealer would think of selling a customer a bell-ringing transformer to use in a building where the service was direct current. Yet they will sell a customer a washing machine or a vacuum cleaner and give the customer an extra extension cord without even suggesting the convenience of a suitable outlet.

The advantage of following up such sales is shown in a recent article in the *Monthly Sales Service* of the Society for Electrical Development. According to this article, one small contractor-dealer makes it a practice when he has sold a fan or other electric appliance to try to deliver it himself. Very often he calls with the fan on his way home in the evening. He goes into the home, supposedly simply to connect the fan and see that it runs properly, but the real reason is to see what wiring work he can find to be done.

In a great many cases he finds that it is necessary to unscrew a lamp in order to connect a fan. Sometimes there is but one light in the room, as in a bedroom. This gives him an excellent chance to suggest the installation of convenient outlets. By guiding the conversation along the right lines he has in several cases made other suggestions which have resulted in improving the customer's wiring—and in business for himself.

This plan can easily be modified so that a salesman delivers the appliance and makes the suggestions. It is a peculiar fact that many people, once having made a purchase, are in a very receptive mood for other sales suggestions.

### HOW CONTRACTOR-DEALERS CAN TIE-IN WITH NATIONAL ADVERTISING.

**National Lamp Works Offers Opportunity for Dealers to Cash In on "The Great Discovery."**

Many manufacturers of electrical devices and appliances are now conducting national advertising campaigns which both in total amount and attractiveness surpass the advertising of practically every other industry. This advertising is securing a great deal of valuable publicity and creating a desire for these appliances from the public. However in order to get the proper results the electrical contractor-dealer must grasp the opportunity thus presented by tying-in with this advertising and letting the public know where they can get the merchandise advertised.

In order to assist its dealers to tie-in with the intensive national advertising campaign which it will conduct from now until the end of this year, the National Lamp Works of the General Electric Co., Cleveland, is distributing a pamphlet describing its advertising plans and the methods by which the local dealer can co-operate and reap the benefits.

The story of the campaign is hinged upon the phrase "The Great Discovery." In every branch of lighting, people need to make the discovery that lighting is of real importance to their comfort and convenience. The factory man, the merchant, and the home maker, all will come to realize it through the medium of the advertisements. It remains for the dealer to come out in front of this advertising, let the people know where they can get good lighting and who can help them secure it. This can only be done by accepting and using the helps offered the dealer by the company.

The first advertisement of the campaign appeared in the Aug. 30 issue of the *Saturday Evening Post.* To accompany this the company sent out to each one of its agents an attractive window trim similar to the advertisement for display at that time. The other advertisements of the series will appear shortly in prominent publications.

In addition to these tie-up trims the company offers the lamp agent 13 other ways to cash in directly on the national advertising. Among these other ways are plan books covering store lighting, window lighting, industrial lighting, refixturing and relamping electric signs, sales plans, and also a salesmen's contest plan book. There are also seasonable trims, litho cut-out displays, counter displays, an ad book to assist the dealer in preparing newspaper copy, monthly advertisements for newspapers, the regular tie-up theater slides and a special monthly slide.

### THE ESSENTIAL FEATURES OF SUCCESSFUL ADVERTISING.

**Quality Goods and Good Service Must Back Up the Dealer's Advertising.**

By Chester A. Gauss.

A great many people consider advertising a mysterious force which can sell goods and services of all kinds regardless of the value given in return. Nothing is further from the truth. Advertising is something that is intimately associated with the com-

modity or services on sale. It cannot be applied successfully to a proposition unless it is founded on principles and qualities dug out from the goods or services themselves.

Advertising can make the first sale of a commodity or services but after that the commodity or services must largely help to sell themselves. Advertising will bring a customer into your store but it will not give him courteous and pleasing service. It will not take an interest in seeing that he secures what is best fitted for his purposes nor that he is satisfied with his purchase. Advertising cannot make goods operate satisfactorily. It cannot say "thank you." All this the electrical contractor-dealer must do himself.

Successful advertising is that which is founded on two things—quality goods and good service. No amount of advertising can counteract the adverse advertising created through the selling of unreliable goods in a poor way.

Advertising in the broader sense of the word does not merely mean the use of printer's ink. It means getting one's goods and services impressed as reliable and inviting upon the minds of a community. Printed advertising will aid in doing this. It is cheaper than making a call on every inhabitant of a city and having a heart to heart talk with him about one's goods and services and consumes less time. It is quicker than waiting for people to become acquainted with the quality of the goods and services through satisfied customers. It is, hence, advisable to use printer's ink but, where used, it should be devoted to telling and convincing people that dealers' goods are of the best quality and that the dealer aims to give the most courteous and satisfactory service in town.

But such advertising must have all its statements backed up. The goods must be of the best value. The store show-windows must be attractively dressed, the exterior of the store pleasingly painted and the interior made attractive and inviting. In addition to this courteous and satisfactory service must be given all who enter.

Printed advertising cannot build up business unless it is backed by goods, store and service. But one's store, goods and services can build up trade without the use of printer's ink more slowly, of course, than with the aid of printed advertising, but upon a firm foundation. Make your goods, services and store an advertisement for you before expecting printers' ink to build up your business.

## MOHAWK JOBBING COMPANY EXPLAINS POLICY TOWARD DEALERS.

**Value of New Self-Selling Box Label Line Also Described to Company's Dealers.**

The laudable attitude of the Mohawk Electrical Supply Co. of Syracuse, N. Y., toward its dealers was explained very clearly in a recent issue of *The Mohawk Trail*, the house organ of the company. In this it was stated that no inquiry that comes from any town or city where there is a Mohawk dealer is ever handled by the company except for the account and profit of the local dealer.

It is the company's aim to build up 100% dealers in every town, selling the full household appliance line so that all the appliances sold there may clear through that dealer and bring him income. For this reason a good strong sales letter is sent in reply to every inquiry from towns where there is a dealer asking the prospect to buy from the dealer. A copy of the reply is sent to the dealer also. If the customer insists on purchasing from the company, the dealer is still taken care of, for the sale is made to his account and he is credited with the retail profit.

In the same issue is an article describing the many advantages of new General Electric self-selling box label line and how it opens an opportunity for the contractor-dealer. For many years dealers have realized that they were badly handicapped from the nature of electrical goods, being for the most part mysterious "electrical things" that did not appeal, for few people knew what they were for. In the new line of packages these devices are changed into appealing household merchandise, for each package is covered with a carefully prepared label illustrating its use. It is the little things like this that count the most in merchandising and they should prove a big help to the dealer in increasing sales.

## BUY ELECTRICAL GOODS AT ELECTRICAL STORES.

**Amusing Incident That Demonstrates Inability of Other Merchants to Sell Electrical Devices.**

An amusing incident occurred in a large department store some time ago that clearly demonstrated the desirability of buying electrical goods from an electrical shop. It happened in the toy department where a large collection of toy motors and other electrically operated toys were attracting a great deal of attention.

A prosperous looking customer approached the saleslady, evidently taken from some other department to fill in during the temporary rush, with the question, "Are all those electrical motors?" Upon receiving a reply in the affirmative he asked to be shown a neat appearing device from the display to which was connected several feet of lamp cord and a plug and a tag announcing the price, $2. He explained that his boy had wanted a motor for some time but appeared doubtful as to whether or not this particular device would fill the bill. The girl readily assured him with the statement that "all you have to do is screw this into any light socket" and the sale was made.

The observer was sorely tempted to interfere in the bargain but did not, feeling that the customer will hereafter patronize electrical stores when shopping for electrical goods—after he has tried to make that bell transformer run.

## SEPTEMBER IS ELECTRIC WASHING MACHINE MONTH.

September has been designated on the electrical merchandising calendar or schedule as "washing machine month." During this month electrical contractor-dealers should concentrate their efforts on this particular device, tie-in with the manufacturers' national advertising, the central-station, jobbers and other dealers in local advertising and publicity, display washers, demonstrate washers, talk washers and sell washers. The short, cold, tempestuous winter days will soon be here when washing by hand is more disagreeable and arduous than ever and drying clothes is next to impossible. The use of an electric washer will shorten the washing time and lengthen the drying time and will enable the housewife to take advantage of the first good day and get her wash out to dry early.

# New Appliances

## *Porcelain Cutouts—Improved Type Current Tap—Cleaner with Motor-Driven Brushes — Automatic Compensator*

### Arrow Porcelain Plug Cutouts.

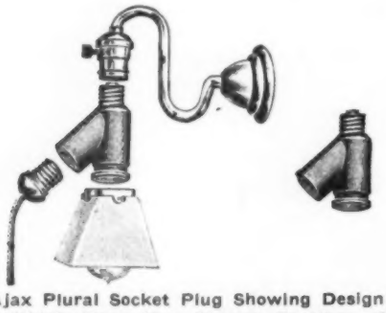
To its extensive line of sockets, receptacles, switches, etc., the Arrow Electric Co., Hartford, Conn., has added a line of porcelain plug-fuse cutouts, of which the one shown is rated

Arrow Plug-Fuse Cutout for 30 Amperes, 125 Volts.

at 30 amperes, 125 volts. They are made in single, double and triple-pole plain types and also in standard double-pole branches from two or three-wire mains. They are all made of the highest grade materials and meet all requirements.

### Ajax Plural Socket Plug.

A new attachment plug especially designed to meet the needs for a two-way plug for the use of a lamp and an appliance at the same time has recently been placed on the market by the Ajax Electric Specialty Co., 1011 Market street, St. Louis, Mo. It is called the Ajax plural socket plug and offers many advantages over many of the older types of such plugs that were primarily intended for the use of two lamps rather than a lamp and appliance. On this account such plugs can not be used in modern lighting arrangement without disturbing the original lighting effect.



Ajax Plural Socket Plug Showing Design Which Does Not Change Position of Lamp. At Right, Plural Plug Only, Showing One-Piece Construction.

In the Ajax plug, as shown by the accompanying illustration, the lighting socket remains directly in line with the fixture socket, the appliance socket being set at an angle to this. The lighting socket terminal is also provided with a groove for attaching shade holders and which will accommodate any ordinary holder. Both sockets are designed to accommodate an Edison base lamp or extension plug. In order to insure a good contact with all such plugs, however, a spring center contact has been placed in both sockets.

The plug is made in one piece, eliminating poor contacts, loss of parts or extra terminals. It is covered with Bakelite insulation, which adds greatly to its ruggedness.

### New Premier Combination Electric Vacuum Cleaner.

The Electric Vacuum Cleaner Co. Inc., of Cleveland, Ohio, has just announced an addition to its line of cleaners to be called the new "Premier." This is styled the complete cleaner and combines three methods—the bristle brush, the rubber-fingered brush and the vacuum. A tufted bristle brush and a pliable rubber-fingered brush, both motor driven and interchangeable, are furnished. Either can be instantly removed and the cleaning done by the machine's extra powerful suction alone.

The rubber-fingered brush is the special feature of this cleaner it being the only machine so equipped. The rubber fingers pick up the dirt in a manner closely akin to that of a human hand performing the same task. The bristle brush is said to be the most effective yet put on the market.

The machine is equipped with a universal-type, air-cooled General Electric motor and rubber-tired wheels to make it easy running and prevent marring the floor. The power control is an integral part of the pistol grip handle—a handle so arranged that it will stand rigidly upright at will. The ingenious nozzle mechanism makes adjustments unnecessary. Because of this improvement the Premier is automatically adjusted to get all the dirt regardless of the depth of the nap.

This machine will retail at a higher price than the present model Premier so that dealers handling the Premier line will have a low and a medium priced cleaner to meet all demands.

### Automatic Compensator for Squirrel-Cage Induction Motors.

The new automatic compensator which has recently been placed on the market by the Industrial Controller Co., Milwaukee, Wis., is a device which is considerably different from anything than has heretofore been offered for the purpose.

This compensator is intended for starting and stopping automatically, or at remote points, squirrel-cage induction motors of practically any size. The entire stopping and starting of the motor is accomplished by means of remote-control stations, one or more of which can be situated at convenient points, while the compensator itself may be located on the ceiling near to the motor, or at any other out-of-the-way location.

The compensator mechanism consists of magnetic contactors operated under oil and which may be easily removed from the oil (revolving around an operating shaft) for convenient inspection or replacement of the contacts. In addition to the magnetic contactors the device contains a suitable autotransformer and two time-limit overload relays, and the entire compensator, including the relays, is enclosed in a single dustproof steel casing.

Under-voltage protection is provided as the magnetic contactors open upon failure of the voltage, and inverse-time-

New Automatic Compensator for Control of Induction Motors from Remote Points.

element relays are provided as standard for overload protection.

A novel feature of this compensator is the fact that the period of acceleration may be at any time changed at the remote-control station without the necessity of disturbing or in any way changing the compensator itself. With this compensator the motor, when so desired, may be "inched," as this in many installations is desired on some types of machinery or when replacing belts.

A suitable lock is provided at each control station, so that when it is desired that the motor be stopped and kept stopped for any reason whatever, it may be locked into the "off" position at the remote-control station so that it cannot be started from the station at which it is locked out or at any other control station operating the compensator.

The makers claim considerable saving in the installation of this type of compensator is due to the fact that it may be conveniently located near to the motor, eliminating long conduit runs for heavy cable which might be required were the hand compensator used.

# Trade Activities

## Edison Electric Appliance Establishes Central District Office — Godfrey Conveyor Co. Incorporates — Literature

**Edison Electric Appliance Co.,** Hotpoint Division, Chicago, has issued price list No. 16 on Hotpoint appliances, effective Aug. 18 and supersedes all previous issues. A supplementary parts price list on Hotpoint devices is also being distributed.

**The Republic Engineers, Inc.,** consulting and constructing engineer, 60 Broadway, New York City, has been engaged by the Pennsylvania Cement Co. in connection with the proposed installation of waste heat boiler and power plant at its cement mill at Bath, Pa.

**Electrical Engineers Equipment Co.,** Chicago, designer and builder of power plant appliances, has appointed F. H. Boyer as a sales representative. Mr. Boyer, who was formerly connected with the Chicago office, has opened an office in the Hubbell building, Des Moines, Iowa, and will represent the company in the states of Iowa and Nebraska.

**E. L. M. Engineering Co.,** Prescott, Ariz., has been organized by W. C. Ellis, L. H. Lockwood, and E. R. McCartney. The new company will handle civil, electric and mechanical work as designers and supervisors throughout the northern part of Arizona. For the past year these gentlemen have been on the engineering staff at Whipple Barracks, General Hospital No. 20, U. S. A., Prescott, Arizona.

**The Wellman-Seaver-Morgan Co.,** Cleveland, Ohio, is distributing Bulletin No. 27, which has for its subject W-S-M automatic ore unloaders. This publication comprises 12 pages and describes at length the successful use of its ore unloaders on the Great Lakes. Excellent illustrations of typical installations of the equipment are given, which give some idea of what may be accomplished by the use of W-S-M ore unloaders. Copies of the bulletin will be furnished free upon request to the company.

**Edison Electric Appliance Co., Inc.,** 5660 West Taylor street, Chicago, announces the establishment of its central district office at its general offices, Chicago, with Walter M. Fagan, district sales manager, in charge. This district comprises the following states: Michigan, Ohio, Kentucky, west half of West Virginia, Wisconsin, Illinois, Indiana, Iowa, Kansas, Nebraska, Colorado, Wyoming, New Mexico, Oklahoma, North Dakota, South Dakota, Minnesota, Arkansas, Texas, Missouri and eastern part of Montana. With the establishment of the central district, all correspondence pertaining to sales matters, covering all lines of apparatus, should be addressed to the attention of the district sales manager. All salesmen of the company will call on customers whether they are selling Hotpoint, Edison, Hughes or General Electric type appliances.

**T. W. Price Engineering Co.,** New York, announces the appointment of J. L. Dixon as metallurgist and electric furnace engineer. Mr. Dixon was instrumental in the development of the Gronwall-Dixon furnace and has had an extensive experience in the design, installation and operation of electric furnaces, covering a period of 11 years. The company will construct and install an electric furnace to be known as the Price-Dixon electric furnace; and in addition will continue to practice consulting engineering, specializing in the design of foundries, rolling mills and also machinery and processes. The Price company has just recently completed the design and purchased equipment for a rolling mill to be installed in Japan.

**Green Engineering Co.,** with main offices and shops at East Chicago, Ind., announces the appointment of E. L. Sullivan as its representative in the Pittsburgh district, including western Pennsylvania, eastern Ohio and western West Virginia. Mr. Sullivan has been a special representative for the McDonough Regulator Co. for the past ten years, six years in Chicago and four in Pittsburgh. He has devoted all of his time to special investigations pertaining to the securing of more efficient boiler and furnace operation. He has had a long intensive experience in matters pertaining to boiler and furnace operation, and the company is to be congratulated on securing such excellent representation for Green chain grate stokers, Sealflex arches, steam jet ash conveyors, cast iron ash tanks, and replacements for the same. Mr. Sullivan will maintain the present offices at 2545 Oliver building, Pittsburgh.

**Allis-Chalmers Manufacturing Co.,** Milwaukee, Wis., manufacturer of concentrating machinery and equipment, is distributing illustrated catalog No. 107, comprising 112 pages. This bulletin describes the latest types and designs of machinery that have been developed to meet the demands of modern practice in the concentration and dressing of ores. Some ten pages are devoted to a discussion of the subject of concentration following which are detailed descriptions of concentrating equipment. Much data are included covering individual machines, devoting particular attention to those machines which have shown the great progress and which are recognized as standard. The bulletin is profusely illustrated, showing views of typical installations of concentrator equipment and of the various types of machines. It contains considerable data which will be of value and assistance in the selection of suitable and properly balanced units for concentration work.

**The Driver-Harris Co.,** Harrison, N. J., is now selling its wire rope products direct to the trade instead of through its former selling agents. These products include sash cord and tiller rope in plain iron, galvanized iron, phosphor bronze, special bronze, monel metal, and all special grades. In addition to this, the company has increased its facilities to include all grades of rope in 6x7, 6x12 and 6x19 construction, such as drilling cable, elevator rope, haulage rope, sand lines, etc., in all sizes up to ¾ in. The other products of the company are resistance materials of nickel alloys in the form of wire, strip and sheet for electric heating controllers, rheostats and resistance elements, wire for spark plugs and weaving; rods and sheets of pure nickel and its alloys; cold rolled strip steel, nichrome castings such as annealing boxes, carbonizing boxes, pots, tubes, rotary and stationary retorts, dipping baskets, pyrometer protection tubes, etc., flexible heater cord and thermostrip.

**Godfrey Conveyor Co.,** Elkart, Ind., has just completed its incorporation, which will enable this firm to manufacture on a much larger scale the Godfrey coal conveyor in order to meet the wide demand for this device. Ever since the first announcement by John F. Godfrey several years ago of a simple and practical conveyor system that would handle all sizes of coal and similar materials mechanically, there has been a steadily increasing interest in Godfrey conveyors on the part of those firms seeking greater economy and efficiency. Although its facilities for delivering the Godfrey conveyor have been increased during the past few months, the sales have far exceeded production and orders have been delayed from fifty to sixty days. The organization is headed by John F. Godfrey, originator, inventor and manufacturer of the conveyors, who has been chosen president of the board of directors. With 15 years' experience in the business of handling coal he is in a position to guide the company along lines required by the needs of industrial plants and dealers. The engineering department, with a staff of capable engineers of extensive experience, is headed by J. Sumner Kirk, under whose guidance special plans are made for every installation of Godfrey conveyors. I. D. Landis is sales manager.

# Current News

## Weekly Record of Construction Activities—Conventions

### EASTERN STATES.

**Rutland, Vt.** — Temple Brothers, operating granite and marble works, have arranged for the electrification of their plant. Electric power will be furnished by the Rutland Railway, Light & Power Co.

**New Bedford, Mass.**—A new power plant will be erected by the Beacon Manufacturing Co. in connection with the erection of an addition to the weave works at its cotton mill.

**Bridgeport, Conn.**—Work has commenced on the erection of a one-story addition to the plant of Harvey Hubbell, Inc. The structure will be 82x140 ft. and cost about $18,000.

**Hartford, Conn.** — Hartford Electric Light Co. has completed plans for the erection of a new power plant at Colt's Meadows. The present plans are for a station with a capacity of 100,000 kw., or 125,000 hp., with oil as the fuel to be used. Construction will be by Stone & Webster.

**Middletown, Conn.**—In connection with the erection of an addition to its webbing works, the Russell Manufacturing Co. plans to erect an extension to its power plant, to include one-story turbine department, 20x20 ft. Plans include a two-story engine and pump house and one-story boiler plant.

**Woonsocket, R. I.**—A new boiler plant and pumping works will be erected by the French Worsted Co., 50x50 ft. on Hamlet avenue, for increased capacity.

**Bath, N. Y.**—Judd Gunderman has been given an option on his mill property with its water rights located between this village and Kanona to the Lamoka Power Co. The Lamoka Power Co. proposes to make extensive improvements.

**Lockport, N. Y.**—The city has under consideration the erection of a municipal light plant.

**New York, N. Y.**—Charles Cory & Son, 290 Hudson street, manufacturers of electrical apparatus, are having plans prepared for a six-story concrete addition, 140x175 ft. to cost about $200,000. Russell G. Cory, 39 Cortlandt street, engineer.

**New York, N. Y.**—New York Edison Co. has awarded a contract to the George Sykes Co., 70 East 45th street, for the construction of a new two-story building, 25x75 ft. at Hester and Norfolk streets.

**New York, N. Y.**—A boiler plant, 35x45 ft. will be erected by Fraser, Brace & Co., 1328 Broadway, in connection with their new shipbuilding and repair plant at Clifton, Staten Island. The entire plant will cost about $3,000,000, and considerable electrical equipment will be required for the different works departments, including machine shop, plate and angle shop, forge and pipe shop, tinsmith and carpenter shop and other works buildings. It is proposed to inaugurate immediate construction.

**New York, N. Y.**—American Radio & Research Corp., 21 Park Row, a Delaware corporation, has increased its capital from $125,000 to $500,000.

**New York, N. Y.**—Electrical and mechanical equipment will be installed by the Bronx Consumers Ice Co., Devoe avenue and 180th street, in connection with alterations and improvements in its one and two-story refrigerating plant to cost about $60,000.

**New York, N. Y.**—Rector Electric Co. has removed its main office from 81 Washington street, New York, to 327 Atlantic avenue, Brooklyn. The former New York office will be retained as a branch.

**New York, N. Y.**—New York Telephone Co. has arranged for immediate extensions and improvements in a number of its local exchange buildings, with the erection of new structures as required. The work includes a new four-story telephone building at Liberty avenue and Milford place, Brooklyn, 60x120 ft. to cost about $200,000, with equipment; alterations and additions to its two-story exchange at West New Brighton, S. I.; and alterations and extensions to its telephone building at Buffalo, N. Y.

**New York, N. Y.**—Plans have been filed in the building department for alterations and extensions in the boiler plant used for the building at 29 East 35th street, property of Q. S. Morgan, to cost about $9000.

**Syracuse, N. Y.**—Dyneto Electric Co., Wolf and Park streets, is planning for the erection of a new one-story plant, 70x200 ft., on Wolf street, to cost about $50,000.

**Brielle, N. J.** — Following a controversy with the Lakewood Coast Electric Co. relative to furnishing service for the Brielle fire house, the borough officials are negotiating with the Atlantic Coast Electric Co., Asbury Park, to extend its lines to this district and enter the field on a competitive basis. The street lighting contract with the Lakewood company has expired, and it is proposed to give a new contract to the Atlantic Coast organization.

**Dover, N. J.**—New Jersey Power & Light Co. is now building a new line to Newton, and expects to have construction completed for service at an early date. Both lighting and power service will be furnished by the company in the Newton district, including domestic and industrial consumption; the initial load is estimated at about 300-kw. The company has secured a power contract with C. Kleiner & Co., who are establishing a cigar manufacturing plant at Dover.

**Garwood, N. J.**—The plant of the C. & C. Electric Manufacturing Co., recently offered for sale at a receiver's sale, has been purchased by Paul E. Ryan, New York, through Joseph P. Day, agent, 31 Nassau street. The plant will be used by the new owner for manufacturing, with large department for the production of aluminum and other castings.

**Keyport, N. J.**—Common Council is arranging a new contract with the Monmouth Lighting Co. for street lighting and service for other municipal work during the coming year.

**Newark, N. J.** — New York Telephone Co., 15 Dey street, New York, is planning for the construction of two new central exchange stations in northern New Jersey, and extension to 40 present switchboards in this territory. The work will provide for an increase of about 11,000 subscribers and is estimated to cost nearly $2,000,000.

**Newark, N. J.**—American Can Co. will build a new boiler plant in connection with its proposed three-story factory, 50x130 ft., at Oliver street, and New Jersey Railroad avenue.

**Newark, N. J.**—A one-story boiler plant, 25x42 ft. will be erected by the American Platinum Works, New Jersey Railroad avenue, in connection with the construction of a factory addition, and alterations and improvements in the present plant to cost about $100,000.

**Newark, N. J.**—Donavan & Erlach Co., 64 Forest street, Kearney, has filed notice of organization to operate an electrical engineering business. Andrew Donavan and James C. Erlach head the company.

**Nutley, N. J.**—A one-story boiler plant addition, 40x53 ft. will be erected by L. Sonneborn & Sons, in connection with the erection of an addition to their local chemical works.

**South Amboy, N. J.**—Monmouth Lighting Co. is planning for improvements in its service in this district. A communication to this effect has been sent to the Common Council.

**Allentown, Pa.** — Lehigh Valley Light & Power Co. and the Lehigh Navigation Electric Co. have filed application with the Public Service Commission for permission to merge under the name of the first mentioned company.

**Carlisle, Pa.**—C. H. Masland &

Sons, Amber street, Philadelphia, are taking bids for a power plant to be erected at Carlisle, in connection with a new carpet manufacturing plant at this place.

**Easton, Pa.**—Pennsylvania Utilities Co. has constructed an additional power line from its Dock street power station to its substation at Ferry street, for increased service.

**Erie, Pa.**—Erie County Electric Co. has commenced the erection of a one-story addition to its turbine plant for increased capacity. The structure will be 60x110 ft., and is estimated to cost $43,000.

**Greencastle, Pa.**—The Town Council is considering plans for the establishment of a municipal electric light and power plant. Plans are under way for co-operation in the erection of a plant with the borough of Waynesboro, which is also planning for a similar station.

**Harrisburg, Pa.** — Application has been made to the Public Service Commission for a merger of a number of power companies in the vicinity of Mauch Chunk, and in Carbon county, under the name of the Industrial Power Co. The new organization plans to operate a large electric generating plant in the anthracite coal fields.

**Morrisville, Pa.**—Considerable electrical and mechanical equipment will be required for the new local sewerage disposal plant to be constructed by the Borough Council. The plant with sewerage system is estimated to cost about $265,000. Thomas F. Bovie, engineer, has prepared plans and specifications.

**Philadelphia, Pa.** — William B. Grimshaw Co., Drexel building, is in the market for a single drum mine type electric hoisting engine, 2300 volts, 3-phase, 60-cycle, a. c. and haul 6 tons up 66% grade at speed of from 2 to 300 ft. per minute.

**Philadelphia, Pa.**—Plans have been filed by the Wirt Co. for a new two-story plant, 62x158 ft. at Green street and Queen Lane, to cost $60,000. Charles Wirt is president.

**Philadelphia, Pa.**—Bell Telephone Co. of Pennsylvania has leased the eight-story building, 47½x120 ft., at 263-65 Broad street, for a new local establishment. The structure has been used heretofore by the Emergency Fleet Corp.

**Philadelphia, Pa.**—Plans are being prepared by Architect M. H. Dickinson, 1785 Chestnut street, for a new boiler plant to be erected in connection with a new local dye and textile works.

**Philadelphia, Pa.**—A boiler and engine plant will be erected by the Rockland Hosiery Co., Kensington avenue, in connection with its proposed hosiery mills at Kensington avenue, near O street.

**Pittsburgh, Pa.** — Maitland-Rago Co., manufacturer of electrical fixtures, has leased the three-story brick building, 20x110 ft., at 1029 Liberty street, for a new establishment.

**Pittsburgh, Pa.**—Susquehanna Collieries Co., operating coal properties in Dauphin, Schuylkill, Northumberland and Luzerne counties, is planning the complete electrification of its works at Williamstown and Lykens, with construction of a new shaft at Big Lick, between Lykens and Wiconisco. The work is estimated to cost about $2,000,000. The company has arranged for a mortgage aggregating $11,000,000, to be used in part for expansion and betterments.

**Pittsburgh, Pa.**—The Government has commenced the construction of a new concrete power plant at Lock No. 3, on the Monongahela river. The structure will be operated by water power and will furnish electric power for the operation of the local lock. Lieut.-Col. Wistar M. Chubb, local United States engineer, is in charge.

**Reading, Pa.** — During the past month the Metropolitan Edison Co. has secured about 913 additional contracts for furnishing electric power. A number of plants in this section are closing down their steam-operated stations, and using central-station service, including the Quaker Silk Mills, which have recently arranged for power supply for works operation.

## DATES AHEAD.

Washington State Association of Electrical Contractors and Dealers. Annual convention, Seattle, Sept. 11. Secretary, Forrest E. Smith, 205 Boston Block, Seattle.

Indiana Electric Light Association. Annual convention, French Lick Springs, Ind., Sept. 11 and 12. Secretary, Thomas Donohue, Lafayette, Ind.

Association of Edison Illuminating Companies. Annual meeting, New London, Conn., Sept. 16-18. Secretary, H. T. Edgar, Stone & Webster, Boston, Mass.

Southeastern Section, N. E. L. A. Annual convention, Asheville, N. C., Sept. 17-19. Secretary-treasurer, T. W. Peters, Columbus, Ga.

Iowa State Association of Electrical Contractors and Dealers. Annual convention, Sioux City, Iowa, Sept. 22 and 23. Secretary, F. Bernick, Jr., Oskaloosa, Iowa.

New England Section, N. E. L. A. Annual convention, New London, Conn., Sept. 22-24. Headquarters, Hotel Griswold. Secretary, Miss O. A. Bursiel, Boston, Mass.

Association of Iron and Steel Electrical Engineers. Annual convention, St. Louis, Mo., Sept. 22-26. Secretary, John F. Kelly, Empire building, Pittsburgh, Pa.

American Electrochemical Society. Fall meeting, Chicago, Sept. 23-26. Headquarters, Congress Hotel. Secretary, Prof. Joseph W. Richards, Lehigh University, Bethlehem, Pa.

International Association of Municipal Electricians. Annual convention, Chicago, Sept. 23-26. Secretary, Clarence R. George, Houston, Tex.

Empire State Gas and Electric Association. Annual meeting, New York City, Oct. 9. Secretary, Charles H. B. Chapin, 29 West 38th street, New York City.

National Association of Electrical Inspectors. Annual meeting, Springfield, Mass., Oct. 13 and 14. Secretary, W. L. Smith, Concord, Mass.

Illuminating Engineering Society. Annual convention, Chicago, Ill., Oct. 20-23. General secretary, Clarence L. Law, 29 West 39th street, New York City.

Illinois State Electric Association. Annual convention, Chicago, Oct. 22 and 23. Secretary-treasurer, R. V. Prather, Springfield, Ill.

**Ellendale, Del.** — Plans are under way to inaugurate operations at the new municipal electric power plant at an early date. The construction of local distributing lines is now under way.

**Baltimore, Md.**—In connection with its proposed group of buildings at Roland Park, the Maryland Casualty Co. is planning for the construction of a large central power plant to furnish electric service to the administration, clubhouse, printing plant and other structures. The entire project is estimated to cost about $2,000,000.

**Baltimore, Md.** — Bethlehem Shipbuilding Co. is planning for the construction of a new drydock, 400x80 ft., at its Sparrows Point plant, to be operated by electric power. Sufficient power capacity will be developed to raise the structure in ten minutes.

**Cumberland, Md.**—Western Union Telegraph Co. and the Baltimore & Ohio Railroad Co. will build a new underground conduit system between the viaduct and Queen City building. The system is estimated to cost $50,000. J. H. Hays, Western Union Telegraph Co., Baltimore, is in charge.

**Sparrows Point, Md.** — The construction of an additional floating drydock, 400 ft. long, 80 ft. wide and 20 ft. deep, equipped with electric power is contemplated by the Bethlehem Shipbuilding Corp.

**Bristol, Va.**—Virginia Tub Co. is in the market for an electric welding machine for round iron tub and bucket hoops.

**Cambria, Va.**—James Rigby & Son are in the market for a 25-30 hp. a. c. motor, 3 phase, 60 cycle, 2300 volts.

**Clarksburg, W. Va.**—A syndicate is being organized to purchase and operate the Grafton Power & Light Co., and the Grafton Traction Co., operating at Grafton and vicinity, and now in bankruptcy. O. E. Wyckoff is referee in bankruptcy for the companies.

**Fairmont, W. Va.** — Monongahela Valley Traction Co. is planning for the erection of a large addition to its electric power plant at Rivesville, to double the present capacity. A new turbogenerator will be installed, with auxiliary operating equipment. The company is also planning for the construction of a new 60,000-volt transmission line from this plant to Grafton and Clarksburg, with a number of distributing branches. A new high tension transmission system will also be built in Barbour county.

**Grafton, W. Va.**—Potomac Edison Co., recently incorporated with a capital of $4,000,000 to take over electrical properties in this district, plans for a new power plant in the mining section to furnish electric power for coal mines operation.

**Belmont, N. C.** — Electrically operated machinery and equipment will be installed in the proposed cotton mill to be established by the Sterling Spinning Co., recently organized with capital of $800,000. R. L. Stowe is president.

**Winston-Salem, N. C.**—J. S. Kuykendall, Winston-Salem, is planning for the establishment of an electric power plant at Black Mountain, to furnish local light and power service.

**Gaffney, S. C.** — Piedmont Telephone Co. will erect a two-story building. Sam Gaulet, mayor.

**Summerville, S. C.** — Summerville Public Service Co. has purchased electric light plant and ice plant and will improve them. M. Barshay, president.

**Bainbridge, Ga.**—Southwest Georgia Power Co. has published its application for charter for the purpose of placing a power plant on Spring Creek. Address I. F. Murphy, or E. J. Perry.

**Fort Pierce, Fla.** — East Coast Lumber & Supply Co. is in the market for 20 electric motors, 5 to 20 hp. W. E. Tylander, general manager.

**Kissimmee, Fla.** — Mach Brothers, Oxford, Fla., will build a mill and install electric motors.

**Daytona, Fla.**—The Daytona Beach Council has granted an electric light and power franchise to Nelson Mounts, who plans to install and operate a local system.

**Stuart, Fla.**—Stuart Public Service Co. recently incorporated with a capital of $50,000, will operate a light and power plant for local electric service. George R. Hilty is president.

## NORTH CENTRAL STATES.

**Fremont, Ohio.**—The plant of the Ohio State Power Co. (on the Sandusky river, six miles from Fremont), was damaged by explosion. The plant valued at $3,000,000 was erected along the Sandusky river a mile south of Fremont, six years ago. The company supplies power to many neighboring towns and in addition furnishes power to the Lake Shore electric lines and the Fostoria and Fremont interurban railway.

**Minerva, Ohio.** — Engineers Froelich & Emery, 412 Second National Bank building, Toledo, are preparing plans for a $50,000 power house and distributing station. R. A. Penweth, mayor.

**Evansville, Ind.**—Ohio Valley Seed Co. will build a five-story mill and grain elevator. The company has increased its capital stock from $25,000 to $100,000.

**Fort Wayne, Ind.**—Thieme Brothers Co., manufacturer of silk hose, will erect a $185,000 factory building.

**Indianapolis, Ind.**—J. D. Adams & Co., manufacturers of road building machinery, will build a new one-story storage house, 162x175 ft., with balcony containing 4100 sq. ft. of floor space, at cost of about $60,000.

**Indianapolis, Ind.**—Henry L. Dithmer, secretary of the Polar Ice & Fuel Co., announces plans in the enlargement of the company's manufacturing and storage capacities which will double its facilities. Additions will be built to three different plants in the city of Indianapolis at an expenditure of $150,000.

**LaFayette, Ind.** — Numerous improvements on building and grounds of Purdue University are being rushed to completion. Throughout the summer a large force of workmen has been at work in the mechanical, civil and electrical buildings, constructing concrete laboratories, testing devices and installing new equipment. A new tractor testing laboratory has been completed.

**Portland, Ind.** — The Detamore plant of the Union Traction Co. of Indiana, has been offered to the city of Portland for $18,000, and a transfer of the property will soon be made. This move has been approved by the citizens of Portland and the factory owners who have been demanding more light and power current.

**Warsaw, Ind.** — A new auditorium will be erected at Winona Lake to cost between $100,000 and $150,000.

**Elgin, Ill.**—A municipal lighting and electric power plant is the expectation of the city commission. A $200,000 bond issue to cover the original cost of the plant is planned and it is stated that a special election to vote upon this question will be held soon.

**Herrin, Ill.** — U. S. Reduction & Atomizing Co. is erecting a $100,000 factory building. The new plant will handle the by-products of the mines around Herrin.

**Rock Island, Ill.**—The plant of the Universal Tractor Works, the property of the Moline Plow Co. will be rebuilt, following a fire which destroyed the machine shops with loss of $150,000.

**Mt. Clement, Mich.**—Henry Ford of Detroit, has petitioned the council for franchise to develop power house from the Clinton river. It is proposed to establish a motor factory here to employ 300 persons.

**Appleton, Wis.**—Langstadt & Meyer Co., manufacturer of farm lighting systems and other electrical equipment, will erect a two-story addition to its plant to cost $25,000. New tools and other equipment will be purchased. Herman Wildhagen is architect.

**Minneapolis, Minn.**—Sales department of the Minneapolis General Electric Co. during the week ended Aug. 15, secured 456 new electric light and power customers with 266 kw. of lighting and 674 hp. in motors. New power business includes contract for 400 hp. in motors with the Schreiber Milling Co., and 90 hp. with the Victoria Elevator Co. New business connected to the company's lines shows an increase of 185 new customers with 135 kw. of lighting and 673 hp. in motors, which includes the two contracts mentioned above as well as 130 hp. for the city of Minneapolis for the construction of the Franklin avenue bridge. An increase of 26.5% is shown in the output of electric energy during the week as compared with the corresponding week last week.

**St. Louis, Mo.** — Wagner Electric Co. is preparing plans for a five-story plant, 160x400 ft.

**Lincoln, Neb.**—Wakefield Electric Co. has applied to the Nebraska Railroad Commission for a certificate of convenience and necessity.

**Mullen, Neb.** — The city contemplates a bond issue for electric light improvements.

## SOUTH CENTRAL STATES.

**Louisville, Ky.** — United Casket Co., will erect a fireproof factory, 100x440 ft., also dry kilns and power house. Planers, molders, sanders, saws, etc., will be installed.

**Louisville, Ky.**—Commercial department of the Louisville Gas & Electric Co. during the week ended Aug. 16, secured 56 new electric light and power customers with 35 kw. of lighting and 158 hp. in motors, and accepted contracts for wiring 11 already built houses. New business connected to the company's lines shows a gain of 57 customers with 20 kw. of lighting and 36 hp. in motors. The output of electric energy was 10.5% greater than during the corresponding week last year.

**Maysville, Ky.** — The council will take up at once the construction of a municipal electric light plant.

**Piedmont, Ala.** — Coosa Manufacturing Co. will erect a $100,000 addition to its mill. Electrical equipment will be purchased.

**De Riddie, La.**—$100,000 in bonds have been voted for building a light and power plant and water works. Address mayor.

**New Orleans, La.**—Plans are being prepared by the Interstate Electric Co. for the erection of three large buildings in New Orleans, to cost about $1,500,000. The company deals in electrical appliances and automobile appliances. Percival Stern is president of the company.

**New Orleans, La.**—The Navy Department will install a power plant here, and purchase equipment to cost $115,000.

**Lexington, Miss.**—Common Council is planning for improvements in the local electric system to cost about $20,000. Bonds for this amount will be voted. W. L. Jordan is city clerk.

**Natchez, Miss.**—National Box Co. will improve its plant. Electrical equipment will be purchased.

**Centreville, Tenn.**—Common Council is planning for the immediate construction of a municipal electric plant to cost about $15,000. Owen L. Bates is mayor.

**Little Rock, Ark.**—Dixie Power Co. has perfected plans for the erection of its proposed hydroelectric power plant near Cotter, on the White river. The station will have an initial capacity of about 100,000 hp., and with machinery and equipment installation is estimated to cost about $4,000,000. A dam about 1500 ft. long and 100 ft. high will be constructed. An extensive high-tension transmission system will be constructed. H. A. Allen, Chicago, is engineer.

**Pine Bluff, Ark.**—Missouri & Southeastern Utilities Co., affiliated with the Arkansas Light & Power Co. is planning for the construction of a new steam operated electric power

plant in this section. A transmission system, with local distributing lines, will also be erected. O. P. Moss is manager.

**Perry, Okla.**—$260,000 light and water bonds have been authorized. Address city clerk.

**Canton, Tex.**—Hercules Power Co. recently incorporated with a capital of $10,000,000, is planning for the erection of a large electric power plant with transmission system thorughout this district. A. B. Saling is manager.

## WESTERN STATES.

**Bonners Ferry, Idaho.**—Washington Electric & Supply Co. of Spokane, is considering the matter of installing a street lighting system here, to include 14 post lamps.

**Sandpoint, Idaho.** — Contract has been closed with the Calispell Light & Power Co., Dalkena, Wash., which purchases electric current from the Sandpoint division of Mountain States Power Co. covering 40 hp. in motors for the Dalkena Lumber Co., with prospects of an additional 100 hp.

**Libby, Mont.**—It is reported that the Lukens-Hazel Mining Co. will expend $240,000 for a 200-ton concentrator, and power plant. A pipe line will be installed from Granite Creek which will develop 600 hp.

**Albuquerque, N. M.** — Rio Grande Light, Heat & Power Co. has had specifications prepared for $4,000,000 electric light plant to be erected at White Rock Canyon on the Rio Grande, 40 miles north of Albuquerque. The power company will maintain its general offices in Philadelphia, with a branch office here.

**Portland, Ore.**—Application for an increase in rates which will enable the company to realize a return of seven per cent on its investment has been filed with the city auditor by the Portland, Railway Light & Power Co. has a necessary formality to the hearing to be held soon before the Public Service Commission. The application gives the city ten days in which to prepare and file its answer as one of the affected parties.

**Colfax, Wash.**—Washington Water Power Co., Spokane, is planning to spend about $28,000 this fall in putting in a heavier line to the city.

**Hoquiam, Wash.**—Plans and specifications have been completed by the Commercial Club for a curb lighting system on 8th and 9th streets.

**Morton, Wash.** — Morton Electric Co.'s plant has been sold to J. P. Haggerty of Tacoma, for $10,000.

**Seattle, Wash.**—Ordinance has been passed by the city council authorizing the Board of Public Works to continue work of investigation to determine proper location for dams and reservoirs in the vicinity of Ruby, Gorge Creek and Diablo Canyon.

**Seattle, Wash.**—J. Bechler, Mayflower Dairy, 917 Virginia street, will erect a brick power house at a cost of $24,000.

**Spokane, Wash.**—Universal Electric Co. will erect a building at 1218 Second street, at a cost of $10,000.

## CANADA.

**Thorold, Ontario.**—Ontario Power Co. is planning for the erection of an addition to its local substation to double the present capacity. A new bank of transformers will be installed, and other operating equipment. Apparatus now at the Welland substation will be utilized, in part in the new addition.

**Winnipeg, Manitoba.** — Winnipeg River Power Co. has commenced the construction of its proposed hydro-electric power plant at Little Du Bonnet Falls, on the Winnipeg river. The structure will be one of the largest plants of its kind in the world; it will have an initial capacity of about 160,000 hp., and is estimated to cost $5,000,000.

## PROPOSALS

**Generator and Equipment.** — Bids will be received Sept. 23, at Saskatoon, Sask., for a steam turbine, alternating current, generator, surface condenser and condenser auxiliaries. C. J. Yorath, city commissioner.

**Power Plant Extensions.**—Bids will be received until 3 p. m., Sept. 10, for extensions and improvements in the power plant and power system at the State Hospital, Binghamton, N. Y. Address State Hospital Commission, Capitol building, Albany.

**Pumps.**—The purchasing agent of Kansas City, Mo., will receive bids until Sept. 17, for a pumping station, centrifugal type pump driven by steam turbine through reduction gears, centrifugal type pump driven by vertical cross-compound Corliss engine. Plans are on file with W. C. Goodwin, chief engineer.

## FOREIGN TRADE

*[Addresses of firms referred to in these trade opportunities may be obtained by writing to the Bureau of Foreign and Domestic Commerce, Washington, D. C., or its branch and local co-operative offices. Request for each opportunity should be on a separate sheet and the file number given.]*

**Lighting Fixtures (30,461).** A firm in Australia wishes to purchase from manufacturers opalescent glass for use in indirect and semi-direct electric fixtures.

**Electrical Supplies (30,462).** A firm of important merchants in India desires to connect with selling agents of American manufacturers of hardware, mill, gin, and railway stores, machinery, electrical supplies, chemicals, dyes, general sundries, etc. Quotations with samples where necessary are requested. Reference.

**Incandescent Lighting Glass (30,466).** The purchase of large quantities of incandescent gas mantles and incandescent lighting glass is desired by a company in England. Quotations should be given c. i. f. London. References.

**Electrical Conductors and Machinery (30,475).** An agency is desired by a firm in Spain for the sale of electric conductors, electrical machinery, material for central generating stations, small electrical material, pumps, turbines, internal combustion motors, and lamps. References.

**Motors (30,498).** The president of a Spanish mining company is in the United States and is soon to return to Spain. He desires to purchase mining machinery, gasoline and kerosene engines, electric motors and equipment, and agricultural machinery. References.

**Wireless Equipment (30,504).** An American firm desires to obtain for one of its clients in Spain all classes of apparatus used by manufacturers of wireless equipment. References.

## INCORPORATIONS

**New Berlin, N. Y.**—Berholme Power Co. Capital, $25,000. To operate a light and power system at South New Berlin. Incorporators: T. B. Parker, F. Van Valkenburg, and E. W. Hovey, all of South New Berlin.

**Rochester, N. Y.**—Rochester Storage Battery Co. Capital, $40,000. To manufacture storage batteries, etc. Incorporators: W. W. Armstrong, E. F. and A. C. Dyver, Rochester.

**New York, N. Y.**—Electric Keyless Lock Co. Capital, $10,000. To manufacture special locking devices. Incorporators: H. Gottesman, S. Greene and A. M. Block, Woolworth building.

**Buffalo, N. Y.** — Milner Flower Electric Co. Active capital, $30,000. To manufacture electrical machinery. Incorporators: C. B. McBride, M. W. Bense and A. E. Moore, 37 Wall street, New York.

**Wilmington, Del.**—Phix Light Co. Capital, $100,000. To manufacture electrical and power machinery. Incorporators: T. L. Croteau, H. E. Knox and S. E. Dill.

**Huntington, W. Va.**—Electric Unit Corp. Capital, $50,000. To furnish light and power service. Incorporators: C. C. Hatzell and E. F. Kincaid, Huntington.

**Fairview, N. C.**—Cane Creek Telephone & Light Co. Capital $10,000. To furnish local electric light and power, and telephone service. Principal incorporator: R. B. Williams.

**Varnville, S. C.**—Twin City Light & Power Co. Capital, $30,000. To operate a local light and power system, with lines to Hampton, S. C. Principal incorporator: R. H. Gibson.

**Indianapolis, Ind.**—Wheeler Automatic Transmission Co. has been incorporated with capital of $500,000 for the manufacture of an automatic transmission which is said to do away with the shifting of gears in automobiles. George W. Ray is the president, and J. M. Milner, secretary-treasurer.

# Personal

## Captain Porter to Take Charge of Railroad Department, Western Electric—F. D. Egan Promoted—Other Changes

JOSEPH D. WHITTEMORE and FRANCIS R. HARBISON have been appointed ancillary receivers for the West Virginia Traction & Electric Co., Morgantown, W. Va., by Judge Orr, United States District Court.

GEORGE R. JONES has been elected assistant to the vice-president of the Public Service Co. of Northern Illinois. Mr. Jones has been connected with the company for more than ten years, most of this time as purchasing agent.

RAYMOND D. SHERMAN, superintendent of the Deerfield River Power Co., Watertown, N. Y., has been promoted to the position of superintendent of the Connecticut River Power Co., both companies being under the management of the New England Power Co.

L. H. STRATFORD, for about two years assistant manager of the W. A. Baehr Co., Great Falls, Mont., is now manager of the Pocatello Gas & Power Co., with headquarters at Pocatello, Idaho. Mr. Stratford is well known in that section, having held important positions with the Utah Power & Light Co., Ogden, and with the Portland Gas & Coke Co., Portland, Ore.

W. H. TIMBIE, who is well known for his teaching in vocational subjects and for his important list of books relating to electrical engineering and applied electricity, has been appointed associate professor of electrical engineering in the Massachusetts Institute of Technology. Mr. Timbie was graduated from Williams College in 1901 with honors, being high in the list of Phi Beta Kappa. During his college course he prepared for teaching and shortly after graduation became a teacher of applied science at the Pratt Institute in Brooklyn. Upon the establishment of the Wentworth Institute in Boston he became head of the Department of Applied Science in that institute. During the past year he has been editor-in-chief of the Committee on Education and Special Training in the United States War Department at Washington. He is joint author with Professor Higbie, of the University of Michigan, of a well known book on alternating currents and himself is author of a book on practical electricity and other books relating to electrical engineering, which are known and used throughout the world. Certain of these books have been translated into foreign languages. Mr. Timbie is a member of the American Institute of Electrical Engineers, the American Society of Mechanical Engineers. He has been active in the National Educational Association and has memberships in other engineering and educational societies. At the Massachusetts Institute of Technology his principal duty will be the supervision of the co-operative course in electrical engineering which is carried on in association with the General Electric Co. This course is arranged so that the students receive a scientific training of very high order in electrical engineering at the institute and associate with this a training in manufacturing methods and shop management and industrial research at the works of the General Electric Co. Mr. Timbie's marked success as a teacher and his enthusiasm in such work assure great success in his new position.

CAPT. GEORGE HULL PORTER has just been appointed manager of the railroad department of the Western

Capt. George Hull Porter.

Electric Co., in charge of the railroad business for the Western Electric Co.'s 53 houses extending from coast to coast. This well merited promotion comes after an experience covering a number of years as railway salesman in Chicago territory. Captain Porter is well and favorably known in railroad circles as well as in the electrical field, having served as president of several railroad associations as well as chairman of various committees. He is also a past president of the Illinois Athletic Club, Chicago. Captain Porter saw service in the army during the war, being attached to the signal corps.

F. D. EGAN, former works manager of the Pittsburgh Iron & Steel Foundries Co., has accepted a position in the General Engineering Department of the Westinghouse Electric & Manufacturing Co. at East Pittsburgh, Pa., where he will devote his entire time to the development of electrical apparatus for steel mill application. Mr. Egan's experience with electrical apparatus as applied to steel mills has extended over a period of a score of years, all of which time was spent in mills in the Pittsburgh district. In 1899 he entered the electrical department of the Carnegie Steel Co.'s Homestead Plant, working under the direction of Alva C. Dinkey, then superintendent of the electrical department. He resigned this position in 1903 to enter Grove City College, where he completed his college course. After graduating from school, he went to work in the inspection department of the Westinghouse Electric & Manufacturing Co., remaining a little over one year, leaving there to accept a position with the Carnegie Steel Co., where he served as assistant chief electrician during the construction of its Nos. 6 and 7 blast furnaces. When this work was completed he joined the electrical engineering force of the National Tube Co.

While working for the tube company Mr. Egan devised a plan whereby he could attend the Engineering School of the University of Pittsburgh and at the same time devote a major portion of his time to his work. After successfully laying his plans before the management, the aspiring engineer entered the university where he studied for two years, when he found it necessary to give up his course for the time being in order that he might enter the electrical superintendent's office. As a result of considerable study and hard work, he was later promoted to the position of assistant superintendent of the electrical department. In 1911, at the end of the construction period that lasted for four years, he left the tube company, accepting a position as electrical engineer with the Pittsburgh Crucible Steel Co. during the construction and operation of its Midland Works. In the latter part of 1917 he left the Crucible Steel Co. to enter the employ of the Pittsburgh Iron & Steel Foundries Co., of Pittsburgh, Pa., as works manager to have charge of all war work done by that company. Serving in that capacity until just recently when he joined the general engineering department of the Westinghouse company. Mr. Egan is a member of the Iron and Steel Committee of the American Institute of Electrical Engineers, a member and past president of the Association of Iron and Steel Electrical Engineers, a member of the Iron and Steel Institute, the Delta Tau Delta Fraternity and the Pittsburgh Athletic Association.

### Obituary.

HENRY A. REED, 88 North 9th street, Newark, N. J., a pioneer in telegraphy, died at his home in that city, Aug. 23, at the age of 90 years. As an operator, Mr. Reed opened in 1850 the first telegraph office on the Harlem Railroad, New York. He was one of the organizers of the Electric Club and Electric Trade Society in New York.

# Institutional Advertising Combined With Specialization

## New Sherwin-Williams Campaign Takes Advantage of Changed Conditions of Property-Owner Demand and Increased Building Activities

By C. L. LEMPERLY, *Advertising Manager, The Sherwin-Williams Company.*

HOW to give sudden point and direction to advertising that had been wholly institutional, says the above named writer in Printers' Ink, was a question with which The Sherwin-Williams Company was recently called on to deal.

Institutional advertising might be compared to a club. It is intended to gain large ends, to cover big space, to carry great weight. But a club is usually not flexible. It cannot be readily bent, nor is it easily adapted to specific ends.

The Sherwin-Williams Company wanted to retain the momentum and larger benefits of its institutional campaign, and at the same time utilize its force in specific directions. The solution lay, it found, in putting spikes on the club, so to speak. It retained the institutional idea of advertising its products as a whole, and at the same time, by featuring certain products in response to changing demands in the market, it lost no ground.

Prior to the war, the company had been advertising its leading lines through national advertising, alternating the schedule by seasons.

Last year, while some advertisers were holding back, Sherwin-Williams decided it was an opportune time to launch a larger campaign than ever, even though its plants were overtaxed with large bulk business, mostly from big manufacturers. Consequently it opened its Products campaign.

This was entirely institutional, telling in double spreads of some particular achievement of the company as an institution. No mention was made of individual products by trade name. The campaign was not designed to bring inquiries.

During the time when this campaign was running there was little or no demand for the household products formerly purchased in large quantities by property owners. This was due to several reasons. Price had gone up, which naturally restricted the demand, as people figured that painting was something which they could put off. Then came the building restrictions. There was not a great deal of activity in the dealer lines while there was tremendous activity in the larger bulk lines.

The large advertising campaign was decided upon, as it had always been a policy of the company to strike out boldly when others were holding back. There was very little paint advertising competition in the publications at the time, which gave this campaign particular prominence and brought about the desired result of making the name and the scope of the institution better known. It presented an opportunity to tell the public about many of the new activities of the company, such as the manufacture of dyes, chemicals, disinfectants, coal-tar products, etc., in addition to the old-established lines of paints, varnishes and insecticides.

### THE PRESENT NEED.

Then came peace which brought a heavy demand for the old dealer lines of paints and varnishes from property and building owners. Painting had been put off for two or three years. Building had been restricted. Now the people were realizing that on account of the high replacement cost of building materials, painting could not be put off much longer. With the taking off of building restrictions great activity followed along these lines.

This meant that there would be specific demand for the company's leading specialties by trade name, a factor that could not be overlooked. The institutional plan had made a decided impression and should be retained.

The solution, therefore, was to retain the "Sherwin-Williams Products" with a touch of institutional copy and to incorporate by groups into the new campaign the leading specialties which the company wanted featured.

This was worked out by retaining practically the same general treatment of the double spreads as in the last campaign, and by adding illustrations in circles showing the use of various specialties.

Groupings were arranged according to seasons, with reference to demand for exteriors or interiors, from homeowners or from manufacturers, etc.

By keeping before the public the institutional thought, and at the same time featuring the leaders, like SWP House Paint, Flat-Tone Wall Paint, Mar-Not Floor Varnish, Rexpar Outside Varnish, etc., it is logical to assume that the question has been met in a satisfactory way. The campaign retains the bigness of the former idea and adds an effective means of acquainting the public with the specific trade names of the articles manufactured.

The company's new plan comprehends an extension of its direct-mail and dealer display service, built around the intention of continuing to make its retail agency as attractive as possible to the old agent and to the prospective agent.

The company's sales for its fiscal year closing August 31, 1919, indicate a realization of the "Million A Month Gain" campaign launched a year ago. The sales reflect directly a condition shown by an investigation among the company's agents and dealers. In this investigation the market situation was reported satisfactory, with brisk demand. Eighty-one per cent of the dealers reported good sales conditions, in spite of the price situation.

The price advances have been due to unprecedented linseed oil, turpentine, and other raw material costs. Only a small percentage of the dealers reported that there was a deferring of purchases on account of the price, and even these stated that the smaller lines were selling well and that only big orders were being held up.

The situation appears to be somewhat similar to that in the automobile field where it is a question, as Ned Jordan says, whether there will be enough automobiles to go around. It is evident that there will not be enough paint and varnish to go around.

Manufacturers who have been operating on a big bulk production have been forced to switch to a peace-time property-owner production without a long preparation period. Many manufacturers advised the retail trade to get orders in early, but orders were smaller than usual. When spring came, dealers deluged the manufacturers with orders, and there appears to be a genuine realization on the part of the public that paint primarily preserves property, whereas the old concept used to be that paint primarily beautified property. As a matter of fact it does both, and painting cannot be put off without genuine economic loss.

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I am giving up my Readjustment Period page this week to the reprint of an article which I think has extraordinary suggestive value. Read it carefully.

C. A. TUPPER *President*
INTERNATIONAL TRADE PRESS, INC., CHICAGO

# Financial News

## Business Uncertainty Temporary.

The business uncertainty which has been occasioned by general industrial unrest and by the focusing of attention on the prevailing level of prices is described as temporary by the National Bank of Commerce in New York in its monthly discussion of the money market.

"In this respect," the bank says, "there would not seem to be grounds for undue apprehension. The business activity of the country is based on fundamentally sound and essential production. With due consideration given to producing costs, the price-level agitation does not threaten general business activity, and losses resulting therefrom should fall mainly on speculative profiteers. Furthermore, as the Federal Reserve Board has pointed out, the existing level of prices has not resulted from an undue inflation of currency.

"There is another aspect of the situation, however, which is receiving too little consideration—namely, the importance which our foreign trade has assumed in relation to our total trade. During the war, production was expanded to meet a good share of the needs of the world. Our industries have been committed to an output greater in many respects than domestic markets can now absorb, so that the continuance of domestic prosperity is involved with our foreign trade. For the fiscal year ending June 30, 1919, the balance of exports to Europe over imports totaled about $4,250,000,000. During the same period, credits extended by the Government to the allied nations amounted approximately to $3,250,000,000. In a word, our exports were financed by ourselves, through the Government, on a long term credit basis. In the present year, however, sums available for such financing are negligible.

"The permanent maintenance of the high level of war exports is not desired, but our own continued prosperity demands that readjustments be effected gradually. The needs of the countries of Europe are common knowledge. Their inability to pay for supplies at once in either gold or goods requires no reiteration. What must be appreciated is that under existing circumstances we cannot afford not to sell to Europe; and that consequently the problem of financing our exports is most urgent.

"Bills are pending in Congress which would provide the legal basis for the formation of financing corporations. There is an unfortunate tendency to hope for salvation by legislation—to delay action pending the enactment of a law. The situation calls for the direction and leadership of men who will work out plans, enlist the co-operative efforts of industry, build up an organization, and go at the matter in hand. Such elements of leadership, which would give meaning to whatever laws may be passed, and would make such measures a success, are not now distinctly in evidence."

## Westinghouse Earnings Show Large Gain.

The business of the Westinghouse Electric & Manufacturing Co. has shown splendid recovery from the falling off incident to the slackening of structural activity following the signing of the armistice.

Bookings are now running at the annual rate of $100,000,000 and billings at $120,000,000, against actual billings of $160,379,943 in the year to March 31, 1919. For a number of months, after the cessation of hostilities, bookings fell considerably below a $100,000,000 rate.

The Essington plant is still busy on government turbine contracts. When this work is completed it is planned to move the turbine business from the East Pittsburgh plant and concentrate all the work of this character at Essington, located on the Delaware river outside of Philadelphia. The facilities thus released at East Pittsburgh will be devoted to the construction of electric locomotives. Contracts have recently been signed with the New Haven railroad for a number of these and with the growth of railway electrification equipment orders are expected to reach substantial proportions.

The company made a manufacturing profit of $31,108,387 on its $160,379,943 of gross in the 1919 year, or 19.3%. At the same rate in the present fiscal year the manufacturing profit on $120,000,000 gross would be approximately $24,000,000. After allowance of $10,000,000 for federal taxes, against $15,000,000 last year, a balance of $14,000,000 would be left for dividends, equal to $9.30 a share on the $74,812,650 preferred and common stocks.

## General Electric to Bid for Foreign Trade.

That the General Electric Co. through its new $20,000,000 subsidiary, the International General Electric Co., plans to make a strenuous bid for foreign business, is the statement of one of its directors. The departure of President Swope for Europe lends color to the belief that announcement of interest to the electrical trade may be expected within a short time. The General Electric Co. has grouped all of its foreign possessions into one corporation, the International General Electric, of which $10,000,000 is 7% cumulative preferred and $10,000,000 common. All of this stock is reported to be in the treasury of the company.

## Foreign Credit Corporation Formed.

Announcement is made of the incorporation of the Foreign Credit Corp., with capital of $5,000,000 and a paid-in surplus of $1,000,000, and with the following officers: President, Grayson M.-P. Murphy, vice-president of the Guaranty Trust Co. of New York; vice-presidents, G. M. Dahl and D. Raymond Noyes. The directors, of whom President E. V. R. Thayer of the Chase National Bank is chairman, will represent the banks in New York and elsewhere that are stockholders of the corporation. The corporation, organized under New York laws, is believed to be the first company formed in this state to do primarily an acceptance business. It will be interested chiefly in the financing of exports, though it will have other broad powers and will accept drafts of both foreign and domestic clients. The manager of the company will be Mr. Noyes. Albert Breton, vice-president of the Guaranty Trust Co. of New York will be the chairman of the executive committee.

## Duquesne Light Issues Bonds.

The Public Service Commission has granted permission to the Duquesne Light Co. to issue bonds for $25,000,000 and notes for $2,000,000, to be used in part for the construction of its proposed new power plant at Cheswick, Pa. Initial construction work on this plant is well under way; the structure with machinery and equipment is estimated to cost about $15,000,000.

## Dividends.

General Electric Co. has declared a dividend of $2 per share, payable Oct. 15 to stock of record Sept. 15.

The board of directors of the Canadian General Electric Co. has declared a quarterly dividend of 2%, also a semi-annual dividend of 3½% on preferred stock, payable Oct. 1 to stock of record Sept. 13.

New York Edison Co. has declared a quarterly dividend of 1¾%, payable Sept. 14.

Galveston-Houston Electric Co. has declared a semi-annual dividend of 3% on preferred stock, payable Sept. 15 to stock of record Sept. 3.

Arkansas Valley Railway, Light & Power Co. has declared a quarterly dividend of 1¾% on preferred stock, payable Sept. 15 to stock of record Aug. 30.

Muskogee Gas & Electric Co. has declared a quarterly dividend of 1¾% on preferred stock, payable Sept. 15 to stock of record Aug. 30.

WEEKLY COMPARISON OF CLOSING-BID PRICES OF SECURITIES OF LEADING ELECTRICAL COMPANIES

Quotations furnished by F. M. Zeller & Co., Rookery Bldg., Chicago.

| | Div. rate. Per cent. | Bid Aug. 26. | Bid Sept. 2. |
|---|---|---|---|
| **Public Utilities.** | | | |
| Adirondack Electric Power of Glens Falls, common | 6 | 13 | 14 |
| Adirondack Electric Power of Glens Falls, preferred | 6 | 78 | 76 |
| American Gas & Electric of New York, common | 10+extra | 120 | 122 |
| American Gas & Electric of New York, preferred | 6 | 41 | 40½ |
| American Light & Traction of New York, common | .. | 220 | 220 |
| American Light & Traction of New York, preferred | 6 | 95 | 95 |
| American Power & Light of New York, common | 4 | 62 | 63 |
| American Power & Light of New York, preferred | 6 | 68 | 68 |
| American Public Utilities of Grand Rapids, common | .. | 10 | 10 |
| American Public Utilities of Grand Rapids, preferred | 7 | 30 | 30 |
| American Telephone & Telegraph of New York | .. | 102 | 102 |
| American Water Works & Elec. of New York, common | .. | 5¾ | 5½ |
| American Water Works & Elec. of New York, particip | 7 | 10 | 10 |
| American Water Works & Elec. of New York, first preferred | .. | 58 | 58 |
| Appalachian Power, common | .. | 5 | 5 |
| Appalachian Power, preferred | .7 | 22 | 22 |
| Cities Service of New York, common | +extra | 438 | 445 |
| Cities Service of New York, preferred | 6 | 75½ | 75¾ |
| Commonwealth Edison of Chicago | 8 | 107 | 108 |
| Comm. Power, Railway & Light of Jackson, common | .. | 23 | 23 |
| Comm. Power, Railway & Light of Jackson, preferred | 6 | 56 | 56 |
| Federal Light & Traction of New York, common | .. | 10 | 10 |
| Federal Light & Traction of New York, preferred | .. | 47 | 47 |
| Illinois Northern Utilities of Dixon | 6 | 75 | 75 |
| Middle West Utilities of Chicago, common | 2+extra | 30 | 30 |
| Middle West Utilities of Chicago, preferred | 6 | 53 | 54 |
| Northern States Power of Chicago, common | .. | 67 | 67 |
| Northern States Power of Chicago, preferred | ex.div.7 | 90 | 91 |
| Pacific Gas & Electric of San Francisco, common | .. | 66¾ | 63 |
| Pacific Gas & Electric of San Francisco, preferred | 6 | 88 | 88 |
| Public Service of Northern Illinois, Chicago, common | 7 | 86 | 85 |
| Public Service of Northern Illinois, Chicago, preferred | 6 | 94 | 95 |
| Republic Railway & Light of Youngstown, common | 4 | 13½ | 13 |
| Republic Railway & Light of Youngstown, preferred | 6 | 50 | 50 |
| Standard Gas & Electric of Chicago, common | .. | 31 | 32 |
| Standard Gas & Electric of Chicago, preferred | 8 | 45½ | *43 |
| Tennessee Railway, Light & Power of Chattanooga, common | .. | 3½ | 5 |
| Tennessee Railway, Light & Power of Chattanooga, preferred | 6 | 15 | 15 |
| United Light & Railways of Grand Rapids, common | 4 | 43 | 45 |
| United Light & Railways of Grand Rapids, preferred | 6 | 68 | 70 |
| Western Power of San Francisco, common | .. | 24½ | 24 |
| Western Union Telegraph of New York | extra | 86¾ | 86½ |
| **Industries.** | | | |
| Electric Storage of Philadelphia, common | 4 | 94 | 96½ |
| General Electric of Schenectady | 8 | 162¼ | 167 |
| Westinghouse Electric & Mfg. of Pittsburgh, common | 7 | 52⅜ | 53⅜ |

*Ex. div.